HIGHLIGHTS

REVISION NO. 33 Jun 01/10

Pages which have been revised are outlined below, together with the Highlights of the Revision

CH/SE/SU C PAGES	REASON FOR CHANGE	EFFECTIVITY
CHAPTER 31		
L.E.P. 1- 8	Revised to Reflect this revision indicating new,revised, and/or deleted pages	
31-10-00 204- 208	Minor additions and amplification **ADDED TEXT.**	
31-31-35 401, 404, 406- 408	Minor additions and amplification **DELETED 'ABOUT 1 MINUTE LATER'**	
31-32-65 01 401	Minor additions and amplification **MOVED TITLE.** Reprinted	
31-32-68 01 401	Minor additions and amplification **MOVED TITLE.**	

Printed in France

CHAPTER 31

INDICATING/RECORDING SYSTEMS

LIST OF EFFECTIVE PAGES

N, R or D indicates pages which are New, Revised or Deleted respectively
Remove and insert the affected pages and complete the Record of Revisions and the Record of Temporary Revisions as necessary

CH/SE/SU	C	PAGE	DATE
RECORD			
OF TEMP.			
REVISION			
L.E.P.	R	1- 8	Jun01/10
T. of C.		1	Jun01/09
T. of C.		2	Dec01/06
T. of C.		3	Dec01/06
T. of C.		4	Jun01/07
T. of C.		5	Jun01/07
T. of C.		6	Jun01/07
T. of C.		7	Jun01/09
T. of C.		8	Jun01/09
31-00-00		1	Jun01/09
31-00-00		2	Jun01/09
31-00-00		3	Jun01/09
31-00-00		4	Dec01/90
31-00-00		5	Jun01/03
31-00-00		6	Dec01/90
31-00-00		7	Dec01/90
31-00-00		8	Dec01/90
31-00-00		9	Dec01/90
31-00-00		10	Dec01/90
31-00-00		11	Dec01/90
31-00-00		12	Dec01/90
31-00-00		13	Dec01/90
31-00-00		201	Dec01/90
31-00-00		901	Dec01/06
31-00-00		902	Dec01/06
31-10-00		201	Jun01/02
31-10-00		202	Jun01/01
31-10-00		203	Mar01/03
31-10-00	R	204	Jun01/10
31-10-00	R	205	Jun01/10
31-10-00	R	206	Jun01/10
31-10-00	R	207	Jun01/10
31-10-00	R	208	Jun01/10
31-11-00		201	Mar01/91
31-11-00		202	Mar01/91
31-11-00		203	Mar01/91
31-21-00		1	Jun01/02
31-21-00		2	Dec01/90
31-21-00		3	Dec01/90
31-21-00		4	Dec01/90
31-21-00		5	Dec01/90
31-21-00		6	Dec01/90
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31-21-00		9	Dec01/90
31-21-00		10	Dec01/90
31-21-00		11	Dec01/90
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31-21-00		502	Jun01/04
31-21-00		503	Dec01/90
31-21-00		504	Dec01/90
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31-21-13		402	Dec01/90
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31-30-00	01	6	Jun01/05
31-30-00	01	7	Dec01/06
31-30-00	01	8	Dec01/06
31-30-00	01	9	Dec01/06
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31-31-00	01	34	Jun01/04
31-31-00	01	35	Dec01/06
31-31-00	01	36	Dec01/06
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31-31-00	01	38	Dec01/06
31-31-00	01	39	Jun01/04

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CH/SE/SU	C	PAGE	DATE
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31-32-00	01	36	Jun01/04
31-32-00	01	37	Jun01/04

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31-32-00	01	58	Jun01/04	31-32-00	01	A 9	Jun01/04	31-32-00	02	32	Jun01/04
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31-32-00	01	88	Jun01/04	31-32-00	02	11	Jun01/04	31-32-00	02	62	Jun01/04

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1. General

This chapter covers the three following main subjects :

R - instruments (Ref. 31-2X)
R - aircraft integrated data system (AIDS) (Ref. 31-3X)
R - weight and balance system (WBS) (Ref. 31-4X)
- electronic centralized aircraft monitoring (ECAM) system and display
R (Ref. 31-5X).

2. Description and Operation

A. Instruments and Panels

(1)Panels

The aircraft is certificated to be operated by two crew members (two pilots).

A third occupant, facing forward, can easily be integrated in the management of the aircraft due to the lay-out and location of the control panels and the new technology features adopted for the forward facing crew cockpit.

The FFCC concept and associated technology also provides :

- decrease of work load
- improvement in man/machine dialogue
- maximum comfort.

Six Cathode Ray Tube (CRT) electronic display units providing high level of flexibility in presentation of information are used for flight guidance, navigation and monitoring of the aircraft. They are 6.25" x 6.25" full color, all interchangeable.

Conventional electromechanical instruments based on the latest technology (digitized equipment, liquid crystal displays LCD) are also used to provide primary or back up information.

Such combination of displays and instruments enables efficient presentation of information to the flight compartment with maximum safety and reliability.

The Captain's and First Officer's panels are dedicated to flight guidance and navigation information and comprise two CRT display units each, one Primary Flight Display (PFD) and one Navigation Display (ND).

The center instrument panel is dedicated to :

- engine management and parameter displays
- aircraft configuration (flap, slat, landing gear)
- aircraft monitoring comprising two CRT display units, left ECAM display unit for warning display (WD) and right ECAM display unit for system display (SD).

The overhead panel is dedicated to detailed aircraft systems controls and monitoring.

The center pedestal provides :

- in the forward part, navigation controls,
- in the center part, mechanical controls for engines, flap/slat, speed brake and pitch trim,
- in the rear part, audio, ECAM and AIDS controls.

The maintenance panel located on the rear panel provides facilities for pre-flight check and maintenance tasks.

R (2)Independent instruments (Ref. 31-2X)

(a)Electrical clocks (Ref. 31-21)

GMT is provided by two fully independent clocks with built-in time base installed on the aircraft, as follows :

- one clock on Captain's main instrument panel 3VU
- one clock on First Officer's main instrument panel 5VU
- a wiring provision for a Third Occupant is made.

The Captain's and First Officer's clock are each associated with a pushbutton switch, located on the respective control wheels, which serves to control the chronometric function.

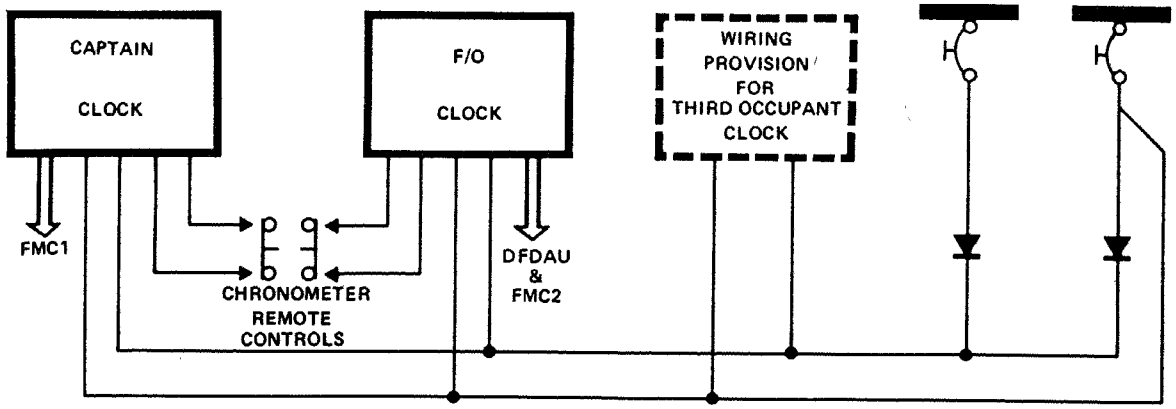
Each of the clocks furthermore provides a GMT output in ARINC 429 data bus format for the digital flight data recorder and the two FMCs.

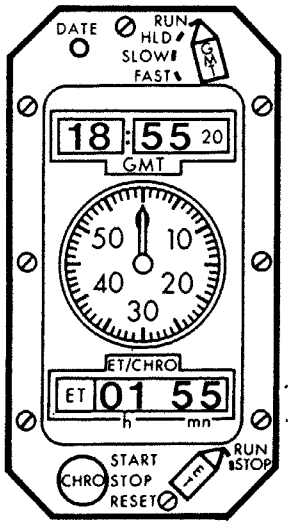
Each clock is powered by two electrical circuits with one circuit directly connected to the aircraft batteries. This enables time to be counted in memory throughout the period that aircraft is parked.

(Ref. Fig. 001)

(b)Clinometers (Ref. 31-23)

Two clinometers are fitted in the right main landing gear well ; the clinometers indicate the slope of aircraft longitudinal and transverse axes when the aircraft is jacked up.





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Electrical Clock - Block Diagram
Figure 001

(Ref. Fig. 002)

B. Recorders (Ref. 31-30)
(Ref. Fig. 003)

(1)Basic AIDS

The basic aircraft is fitted with an ARINC 717 data recording system. The installation comprises one Digital Flight Data Acquisition Unit (DFDAU), one Digital Flight Data Recorder (DFDR), one three axis Linear Accelerometer (LA) and one Control Panel (C.P).

- The DFDR is installed at the rear of the aircraft inside the pressurized area.
  An Underwater Locating Beacon (ULB) is directly attached to the face of the DFDR. The ULB is serviceable without disassembly of the DFDR.
  The DFDR is equipped with a second attachment bracket. Space provision is made on the A/C to install a second connection between the recorder and the structure.
- The DFDAU is installed in the avionics compartment and the LA near the aircraft center of gravity.
- The C.P is located on the overhead panel in the flight compartment.
  The recorder runs automatically in flight and on ground when either engine is running and until 5 minutes after both engines have been stopped.
  The parameters sampled by the DFDAU and recorded on the DFDR tape consist of various groups of parameters. There is a basic part which includes the mandatory parameters and optional flight test part.
  For certification purposes some of the basic/mandatory parameters are modified in source, signal type or sampling rate.
  The parameters processed in the DFDAU are listed in 31-31-00 and 31-32-00. This description includes details about the source, input characteristics, input connector pin assignment and output characteristics of the parameters.
  The source of each parameter is described in the parameter list (Ref. 31-32-00).

(2)Expanded AIDS

This optional definition is obtained by :

- addition of one Data Management Unit (DMU) on the electronics racks and one Digital AIDS Recorder (DAR).
- adjunction of one Control Display Unit (CDU) located in the flight compartment, on the rear panel.
- adjunction of an airborne printer beside the CDU.

C. Central Computers (Ref. 31-40)

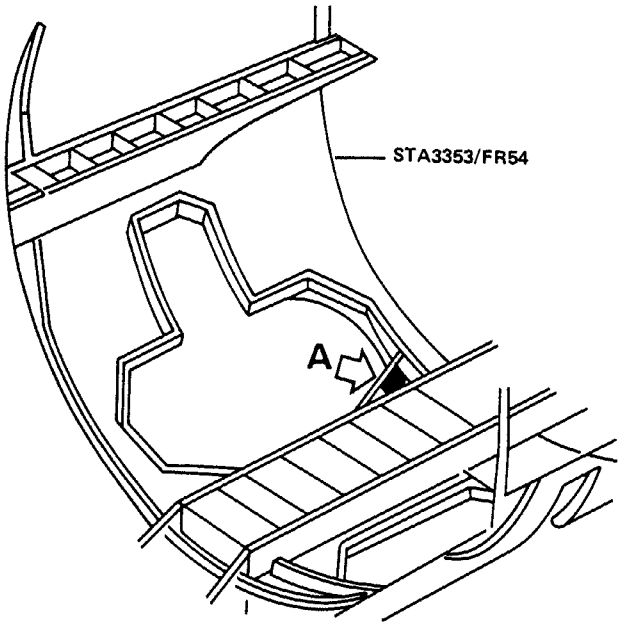
Not applicable.

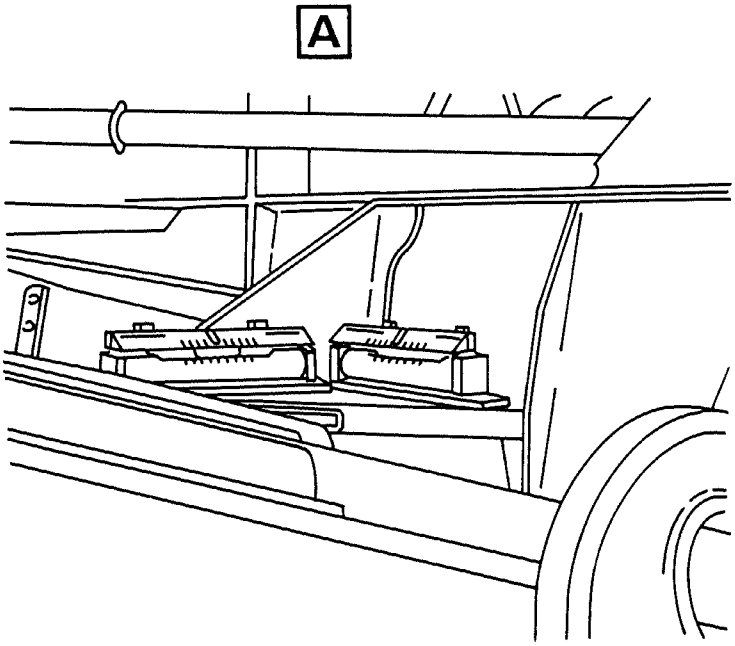
D. Central Warning Systems (Ref. 31-50)
(Ref. Fig. 004)

(1)ECAM system - general (Ref. 31-51)

The ECAM (Electronic Centralized Aircraft Monitoring) system provides the crew with operational assistance for both normal and abnormal aircraft system configurations.

(a)Normal configuration (without aircraft system failure)





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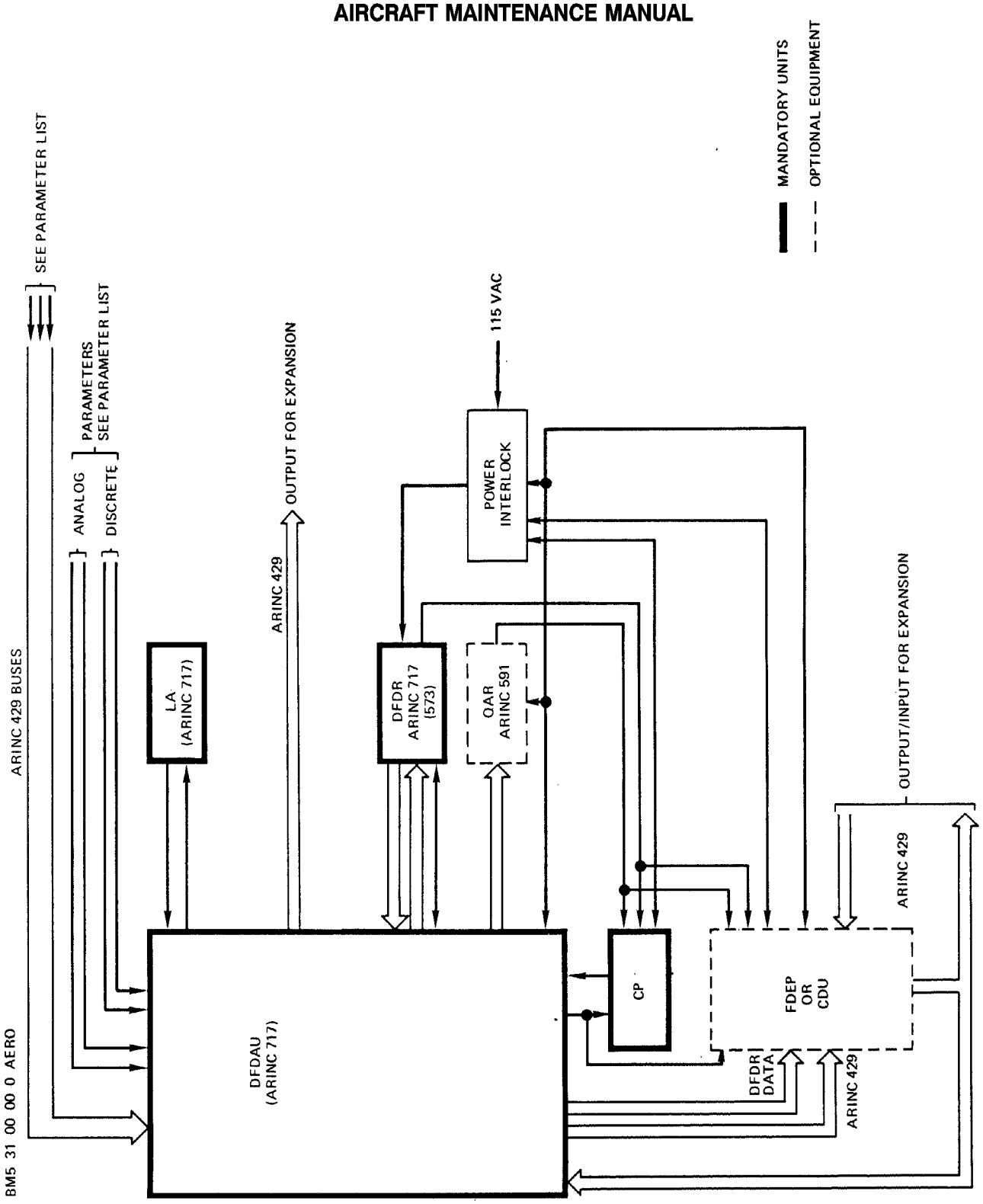
Clinometers
Figure 002



Basic and Expanded AIDS Architecture
Figure 003

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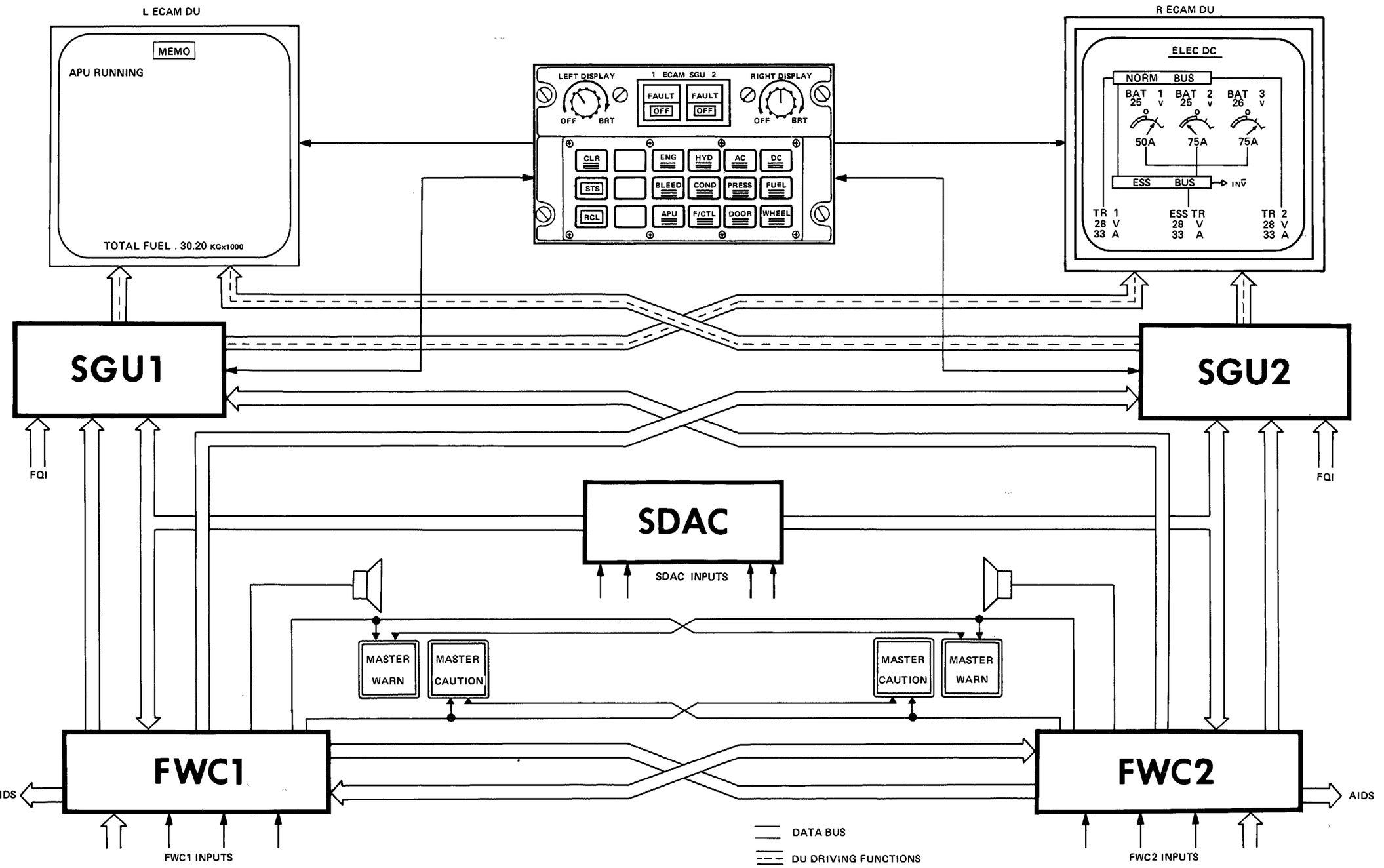

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ECAM System - Block Diagram
Figure 004

The ECAM system improves crew comfort by eliminating the need for frequent scanning of various system panels.

(b) Abnormal or emergency configuration

The ECAM system decreases significantly the crew mental workload by providing :

- Improved failure analysis
- Guidance of corrective actions
- Minimization of need to refer to paper check list or normal read out
- Improved understanding of aircraft and system configuration after failure.

In addition the ECAM system generates aural and visual warnings. The aural warnings are transmitted by the flight compartment loudspeakers and the visual signals supply the ECAM display units. The ECAM system consists of :

- two FWCs (Flight Warning Computer) which acquire the aircraft systems data to process warning indicating and the status functions.
- a SDAC (System Data Analog Converter) which acquires various analog and discrete data and converts them into digital form necessary for further processing.
- two SGUs (Symbol Generator Unit) which process outputs from both FWCs, SDAC and FQI systems in order to present either system displays or various messages.
- two full-color shadow-mask high-resolution CRT display units which present system displays and messages.
- one amber MASTER CAUTION light steady and one red MASTER WARN light flashing located on each Captain's and First Officer's main instrument panel provide the crew with an indication of the faulty aircraft system as a back up of the ECAM display units.
- an ECAM control panel which allows the crew to :
  . clear warning presentation
  . call manually the STATUS function
  . play back the failure sequence
  . select manually a system display.
- an audio interface with :
  . 2 loudspeakers
  . 1 WARNING SYS/NORM CANCEL pushbutton switch
  . 1 WARNING SYS/EMER CANCEL switch.
- an ECAM maintenance panel which is used for all maintenance operations and trouble-shooting on ground.

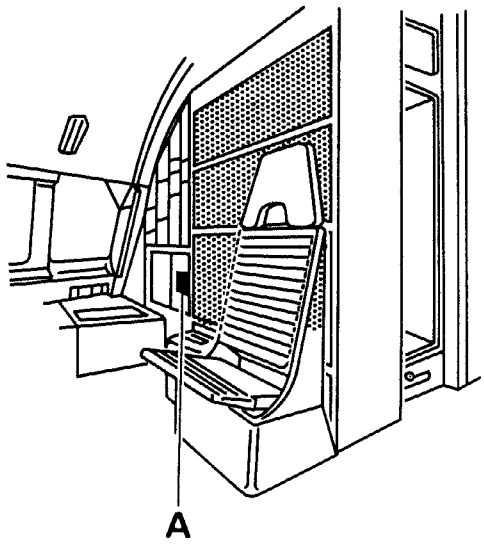
E. Central System Display (Ref. 31-60)
(Ref. Fig. 005)

This section deals with the description of the circuit breaker monitoring system only (Ref. 31-69).

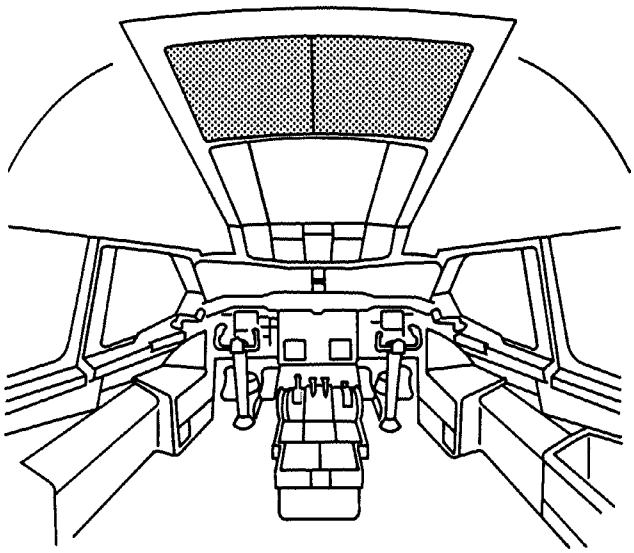
The initial function of the circuit breakers is to protect the aircraft wiring against overheat in case of short circuit.

- Nevertheless, circuit breakers are frequently used on the ground to isolate electrical circuits for maintenance purpose.
- This implies that during flight compartment preparation, it must be checked that no circuit breaker has been left open by the maintenance

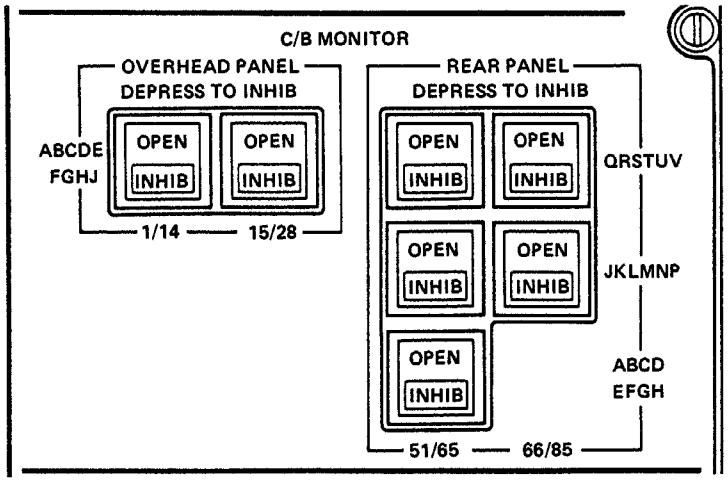
REAR PANEL CIRCUIT BREAKERS



OVERHEAD PANEL CIRCUIT BREAKERS



A



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C/B MONITOR Panel
Figure 005

personnel.
- The circuit breaker monitoring system is designed to simplify and optimize this check.
- This system however is not designed to monitor circuit breakers in flight, as such failures (amongst others) have been taken into account by the safety analysis of the corresponding system.
- In practice it is never required to close a circuit breaker in flight, since, except the case of circuit breaker failure, the most probable cause of tripping is a true short circuit.

VU PANELS - Removal/Installation
Mandatory
At least one wire of each disconnected connector must be tested ; the function with the most important operational effects shall be tested preferably.

CAUTION : THIS PROCEDURE IS TO BE USED ACCORDING TO THE REQUIREMENTS OF THE MEL.

1. TO CONFIG TEST Deactivation

A. Reason for the Job
To make the TO CONFIG TEST function inoperative and to test that the ECAM warning function is not affected.

B. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

C. Procedure
(1)Job set-up
(a)On pedestal 417VU, remove TO CONFIG TEST pushbutton switch 25WW.
(b)Install placard indicating that TO CONFIG TEST is inoperative.
(c)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
R (d)On PROBE HEAT section of overhead panel 433VU, select CAPT pushbutton
R switch ON.
R (e)Open, safety and tag the following circuit breakers.

PANEL	SERVICE	IDENT.	LOCATION
133VU	HYDRAULIC-L/G PROX DET AND RELAYS SYS2 FLT/GND	1GB	331/V52
133VU	HYDRAULIC-L/G SYS1 RELAYS AND RETRACT CTL	2GB	332/U51

(2)Test

ACTION	RESULT
On PROBE HEAT section of overhead panel 433VU - select CAPT pushbutton switch OFF	- Single chime sounds. On left ECAM display unit, the following message is displayed : CAPT PROBES HEAT OFF

(3)Close-up
(a)Close circuit breakers 1GB and 2GB.
(b)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2. TO CONFIG TEST Reactivation

A. Reason for the Job

To enable trouble shooting procedure to be performed.

B. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 27-61-00, P. Block 501	Electrical and Mechanical Control (Spoilers and Speedbrakes)

C. Procedure

(1)Job set-up

(a)On pedestal, install **TO CONFIG TEST** pushbutton switch.

(b)Remove placard indicating that **TO CONFIG TEST** is inoperative.

(c)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(2)Test

Perform operational test of **TO CONFIG** warning light test (Ref. 27-61-00, P. Block 501).

(3)Close-up

(a)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(b)Restore system and aircraft to normal operating condition.

1. Reason for the Job

Do the tests necessary after removal/installation of a VU panel :
- to make sure that all the primary functions are operational
- without a full check of all the wiring.

This procedure gives the tests for all the primary functions you can find on the different versions of each VU panel. It is possible that your version of the panel does not have all of these functions. Do the tests that are applicable to your version of the panel.

2. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedures	
R - ESPM 20-52-10	Electrical Inspections/Checks
- 21-11-00, P. Block 501	Flow Control and Indicating
- 21-22-11, P. Block 401	Cabin Fan 1HG, 5HG, 9HG
- 21-23-00, P. Block 501	Electronics Racks Air Extraction
- 21-31-00, P. Block 501	Cabin Pressure Control and Monitoring
- 21-53-00, P. Block 501	Emergency Ram Air Inlet
- 21-55-00, P. Block 501	Ground Cooling
- 21-55-13, P. Block 401	Ground Cooling Valve
- 21-61-00, P. Block 501	Pack Temperature Control
- 21-62-00, P. Block 501	Trim Air Control and Overheat Monitoring
- 21-63-00, P. Block 501	Flight Compartment and Cabin Temperature Control
- 21-64-00, P. Block 501	Cargo Compartment Temperature Control
- 23-11-00, P. Block 501	HF System
- 23-12-00, P. Block 501	VHF System
- 23-22-00, P. Block 501	Selective Calling System
- 23-24-00, P. Block 501	Aircraft Communication Addressing and Reporting System (ACARS)
- 23-31-00, P. Block 501	Passenger Address System
- 23-36-00, P. Block 501	Passenger Entertainment (Video)
- 23-41-00, P. Block 501	Flight Interphone
- 23-43-00, P. Block 501	Cabin and Flight Crew Call System
- 23-44-00, P. Block 501	Cabin and Service Interphone
- 23-51-00, P. Block 501	Audio Integrating
- 23-71-00, P. Block 501	Cockpit Voice Recorder
- 24-24-00, P. Block 501	Emergency AC Generation
- 24-25-00, P. Block 501	AC Essential Generation Switching
- 24-32-00, P. Block 501	DC Normal Generation
- 24-50-00, P. Block 501	Electrical Load Distribution
- 24-56-00, P. Block 501	Galley Supply
- 25-15-11, P. Block 401	Captain and First Officer Feet Heating Panels
- 25-63-00, P. Block 501	Evacuation Signaling Equipment
- 26-12-00, P. Block 501	Engine Fire and Overheat Detection
- 26-15-00, P. Block 501	Avionics Compartment Smoke Detection

ITEM	DESIGNATION
- 26-15-21, P. Block 401	Smoke Detection Sniffer Fan
- 26-16-00, P. Block 501	Cargo Compartment Smoke Detection
- 26-19-00, P. Block 501	Upper Deck Cargo Compartment Smoke Detection
- 26-21-00, P. Block 501	Engine Fire Extinguishing
- 26-23-00, P. Block 501	Cargo Compartment Fire Extinguishing
- 27-12-00, P. Block 501	Trim (Aileron)
- 27-14-00, P. Block 501	Hydraulic Actuation (Aileron)
- 27-22-00, P. Block 501	Trim (Rudder)
- 27-23-00, P. Block 501	Artificial Feel and Rudder Travel Limiting
- 27-33-00, P. Block 501	Artificial Feel (Elevator)
- 27-54-00, P. Block 501	Hydraulic Actuation and Power Transmission (Flaps)
- 27-61-00, P. Block 501	Electrical and Mechanical Control (Spoilers and Speedbrakes)
- 27-84-00, P. Block 501	Hydraulic Actuation and Power Transmission (Slats)
- 28-21-00, P. Block 501	Fuel Pump System
- 28-22-00, P. Block 501	Tank Isolation System
- 28-23-00, P. Block 501	Crossfeed System
- 28-24-00, P. Block 501	LP Fuel Fire Shut Off Control
- 28-26-00, P. Block 501	Fuel Transfer (CG) Control System
- 28-27-00, P. Block 501	Fuel Transfer (CG) Pump System
- 28-28-00, P. Block 501	Additional Center Tank Transfer System
- 28-46-00, P. Block 501	Tank Level Warning
- 29-14-00, P. Block 501	Hydraulic Reservoir Pressurizing System
- 29-21-00, P. Block 501	Green Auxiliary Power
- 29-22-00, P. Block 501	Blue Auxiliary Power
- 29-23-00, P. Block 501	Yellow Auxiliary Power (Power Transfer Unit)
- 29-31-00, P. Block 501	Hydraulic Quantity Indicating
- 29-33-00, P. Block 501	Hydraulic Fluid Temperature Indicating
- 30-11-00, P. Block 501	Wing Ice Protection
- 30-21-00, P. Block 501	Engine Air Intake Ice Protection
- 30-31-00, P. Block 501	Probe Ice Protection
- 30-42-00, P. Block 501	Windshield Panel Anti Icing and Defogging
- 30-45-00, P. Block 501	Windshield Rain Removal System
- 30-81-00, P. Block 501	Ice Detection
- 31-31-00, P. Block 501	AIDS Interconnection - Interfaces
- 31-51-00, P. Block 501	ECAM System
- 32-31-00, P. Block 501	Normal Extension and Retraction
- 32-42-00, P. Block 501	Normal Braking
- 32-44-00, P. Block 501	Alternate Braking Without Anti Skid
- 32-45-11, P. Block 401	Parking Brake Control Handle (7GG)
- 32-61-00, P. Block 501	Indicating and Warning
- 33-12-00, P. Block 501	General Illumination
- 33-13-00, P. Block 501	Instrument and Panel Integral Lighting
- 33-14-00, P. Block 501	Reprogrammable Annunciator Light Test Unit (RALTU)
- 33-31-00, P. Block 501	Service Area Lighting
- 33-41-00, P. Block 501	Navigation Lights

ITEM	DESIGNATION
- 33-42-00, P. Block 501	Landing Lights
- 33-43-00, P. Block 501	Runway Turnoff Lights
- 33-46-00, P. Block 501	Taxi and Takeoff Lights
- 33-47-00, P. Block 501	Logo Lights
- 33-48-00, P. Block 501	Anti-Collision Lighting
- 33-49-00, P. Block 501	Wing and Engine Scan Lighting
- 34-10-00, P. Block 501	Flight Environment Data
- 34-25-00, P. Block 501	Inertial Reference System (IRS)
- 34-28-00, P. Block 501	Standby Compass
- 34-34-00, P. Block 501	Windshield Guidance Display
- 34-36-00, P. Block 501	ILS
- 34-48-00, P. Block 501	Ground Proximity Warning System
- 34-55-00, P. Block 501	VOR
- 34-60-00, P. Block 501	Flight Management System
- 34-71-00, P. Block 501	EFIS - General
- 35-13-00, P. Block 501	Indicating
- 35-21-00, P. Block 501	Passenger Oxygen System
- 36-11-00, P. Block 501	Engine Bleed Air Supply System
- 49-10-00, P. Block 501	Power Plant
- 49-31-00, P. Block 501	Fuel Distribution
R - 52-51-00, P. Block 501	Flight Compartment Door
- 71-00-00, P. Block 201	Power Plant - General
- 72-00-00, P. Block 201	Engine - General
- 73-15-00, P. Block 501	Fuel Heating
- 74-00-00, P. Block 501	Ignition - General

3. Procedure

A. For each VU :
- do a visual check of the locking of the connectors (Ref. ESPM 20-52-10),
- carry out operational test of Annunciator Light Test (Ref. AMM 33-14-00, P. Block 501).
- carry out operational test of Instrument and Panel Integral Lighting (Ref. AMM 33-13-00, P. Block 501).

B. For the VUs listed in the table below, do the related operational tests

VU	PB	Test
2	343600 PB 501	Functional Test of Information Switching
	345500 PB 501	Operational Test of VOR System
	346000 PB 501	Operational Test of CDU FMC Cross Talk
3	315100 PB 501	Operational Test of FWCs
	344800 PB 501	Test of Input Interfaces
	345500 PB 501	Operational Test of VOR System
4	223000 PB 501	Operational Test of Autothrottle
	275400 PB 501	Operational Test of Flap System
	278400 PB 501	Operational Test of Slat System
	315100 PB 501	Operational Test of FWCS

VU	PB	Test
	323100 PB 501	Test of Landing gear Extension/Retraction System - Control and Indicating
	326100 PB 501	Warning Test using LDG GEAR
	324200 PB 501	Operational Test of Normal Braking
	321400 PB 501	Operational Test of Annunciator Lights
	341000 PB 501	Operational Test of Flight Environment Data
	342700 PB 501	Operational Test of Standby Horizon
	771121 PB 401	N1 Indicator Test
	771221 PB 401	N2 Indicator Test
	771521 PB 401	EPR Indicator Test
	772121 PB 401	EGT Indicator Test
	733100 PB 501	FU Indicator Test
	793300 PB 501	Press Indicator Test
5	315100 PB 501	Operational Test of FWCs
	344800 PB 501	Test of Input Interfaces
	345500 PB 501	Operational Test of VOR System
9	275400 PB 501	Operational Test of Flap System
	276100 PB 501	Functional Test of Speedbrakes
	278400 PB 501	Operational Test of Slat System
	324400 PB 501	Brake Accumulator System Test
	324511 PB 401	Parking Brake Handle
	710000 PB 501	Test No. 2 Wet Motoring
13	343400 PB 501	Operational Test of Windshield Guidance Display
16	331200 PB 501	General Illumination Adjustment/Test
17	331200 PB 501	General Illumination Adjustment/Test
45	256300 PB 501	Evacuation Signalling Equipment Adjustment/Test
	315100 PB 501	Operational Test of FWCs
76	231200 PB 501	Operational Test of VHF System
	323100 PB 501	Test of Landing Gear Extension and Retraction System Electrical Control and Indicating Circuit
119	525100 PB 501	Operational Test of Electrical Flight Compartment Door
287	235100 PB 501	Operational Test of Audio Integrating
288	235100 PB 501	Operational Test of Audio Integrating
400	323100 PB 501	Test of Landing Gear Extension/Retraction System Control and Indicating
	326100 PB 501	Warning Test using LDG GEAR/WARNING Test Pushbutton Switch
401	324200 PB 501	Normal Braking Operational Test Annunciator Light Operational Test
402	251511 PB 401	Test after Removal/Installation of Carpet Heat 7DR
R	341000 PB 501	Operational Check of DADC Switching
	342500 PB 501	Operational Test of Inertial Reference System
	343600 PB 501	Functional Test of Information Switching
	344800 PB 501	Operational Test of Ground Proximity Warning System
	344800 PB 501	Test of Input Interfaces
	345500 PB 501	Operational Test of VOR System
	346000 PB 501	Operational Test of CDU FMC Cross Talk

	VU	PB	Test
		347100 PB 501	Operational Test of EFIS-Switching Test of PFD/ND XFR
	406	251511 PB 401	Test after Removal/Installation of Carpet Heat 7DR
R		341000 PB 501	Operational Check of DADC Switching
		342500 PB 501	Operational Test of Inertial Reference System
		343600 PB 501	Functional Test of Information Switching
		345500 PB 501	Operational Test of VOR System
		346000 PB 501	Operational Test of CDU FMC Cross Talk
		347100 PB 501	EFIS - SGU Switching Test
	408	271200 PB 501	Operational Test of Aileron Trim
		272200 PB 501	Operational Test of Rudder Trim
	409	232400 PB 501	Operational Test of ACARS CALL Indicator Light
		235100 PB 501	Operational Test of Audio Integrating
		344800 PB 501	Cockpit Self Test
	410	331200 PB 501	General Illumination Adjustment/Test
	411	331200 PB 501	General Illumination Adjustment/Test
	412	347100 PB 501	Complementary Navigation Control Panel Test - FPV/FD Switching - VOR/NAV/ILS Switching
	413	347100 PB 501	Complementary Navigation Control Panel Test - FPV/FD Switching - VOR/NAV/ILS Switching
	414	234100 PB 501	Flight Interphone Adjustment/Test
		234400 PB 501	Operational Test of Courier Communication System
		313100 PB 501	Event Marker AIDS Operational Test
		331200 PB 501	General Illumination Adjustment/Test
	417	315100 PB 501	Loudspeakers and Warning SYS/EMER Cancel Pushbutton Switch Test - T.O Config Test of Probe Heat Off
	418	231100 PB 501	HF System Adjustment/Test
		234400 PB 501	Cabin and Service Interphone Adjustment/Test
		313100 PB 501	Event Marker AIDS Operational Test
		331200 PB 501	General Illumination Adjustment/Test
	419	231100 PB 501	Transmission Test of HF Operational Test
		234100 PB 501	Flight Interphone Adjustment/Test
		234400 PB 501	Cabin and Service Interphone Adjustment/Test
		235100 PB 501	Operational Test of Audio Integrating
		261521 PB 401	Sniffer Fan
		331200 PB 501	General Illumination Adjustment/Test
	420	231100 PB 501	HF System Adjustment/Test
		233100 PB 501	Passenger Address System
		234100 PB 501	Flight Interphone Adjustment/Test
		235100 PB 501	Operational Test of Audio Integrating
		261521 PB 401	Sniffer Fan
		331200 PB 501	General Illumination Adjustment/Test
	421	233100 PB 501	Passenger Address System
		234100 PB 501	Flight Interphone Adjustment/Test
		235100 PB 501	Operational Test of Audio Integrating
		251511 PB 401	Test after Removal/Installation of Carpet Heat 8DR
		261521 PB 401	Sniffer Fan

VU	PB	Test
422	233100 PB 501	Passenger Address System
	235100 PB 501	Operational Test of Audio Integrating
	251511 PB 401	Test after Removal/Installation of Carpet Heat 8DR
	261521 PB 401	Sniffer Fan
423	232200 PB 501	Operational Test of Selcal System
	233100 PB 501	Passenger Address System
	234200 PB 501	Operational Test of Ground Crew Call System - Test of Crew Member-to-Ground Mechanic Call
	234300 PB 501	Cabin and Flight Crew Call System
	291400 PB 501	Functional Test of Each Hydraulic Reservoir Low Air Press Detection and Warning Circuit
	293100 PB 501	Operational Test of Hydraulic Quantity Indication
	293300 PB 501	Test of Temperature Monitoring System
	331200 PB 501	General Illumination Adjustment/Test
	332600 PB 501	Passenger Lighted Signs
424	242400 PB 501	Operational Test of the Static Inverter
	242400 PB 501	Functional Test of the Electrical Standby Generating System - Test of the Standby Generator Manual Starting
	242500 PB 501	Operational Test of ESS Busbar Power Supply
	243200 PB 501	Operational Test of TR1, TR2 and ESS TR Fan
	245000 PB 501	Operational Test of Land Recovery Function
	245600 PB 501	Operational Test of Galley Shedding System
	261500 PB 501	Avioncs Compartment Smoke Detection Operational Test
425	242400 PB 501	Operational Test of the Static Inverter
	242400 PB 501	Functional Test of the Electrical Standby Generating System - Test of the Standby Generator Manual Starting
426	302100 PB 501	Operational Test of the Engine Air Intake Ice Protection
	301100 PB 501	Operational Test of the Wing Anti Ice Protection
	308100 PB 501	Functional Test of Ice Detection System by Simulating Ice Accretion
	334100 PB 501	Operational Test of Navigation Lights
	334200 PB 501	Operational Test of Landing Lights
	334300 PB 501	Operational Test of Runway Turnoff Lights
	334600 PB 501	Operational Test of Taxi and Takeoff Lights
	334700 PB 501	Operational Test of Logo Lights
	334800 PB 501	Operational Test of Anticollision Lighting
	334900 PB 501	Operational Test of Wing and Engine Scan Lighting
427	291400 PB 501	Functional Test of Each Hydraulic Reservoir Low Air Press Detection and Warning Circuit
	292100 PB 501	Operational Test of Green Auxiliary Power Indicating Circuits and Electric Pump Operation
	292200 PB 501	Operational Test of Green/Blue Indicating Circuits and Green/Blue Power Transfer Unit Operation
	292300 PB 501	Operational Test of Green/Yellow Indicating Circuits and Green/Yellow Power Transfer Unit Operation
	293100 PB 501	Operational Test of Quantity Indicators and Legends

VU	PB	Test
	293200 PB 501	Operational Test of the Green, Blue and Yellow Hydraulic System Pressure Indicating and Associated Warnings
	293300 PB 501	Operational Test of Temperature Monitoring System
428	271400 PB 501	Test of Servo Control Jamming Detection (roll, yaw and pitch)
	272300 PB 501	Test of Warnings in the event of ADC Failure
	273300 PB 501	System Disengagement Test
	275400 PB 501	Test of Flap G and Y Low Hydraulic Pressure Function
	276100 PB 501	Spoiler and Speed Brake Electrical Power Supply Test (step 1 to 4)
	278400 PB 501	Test of Slat G and B Low Hydraulic Pressure Function
429	304500 PB 501	Functional Test of the Windshield Rain Removal System
	491000 PB 501	Operational Test of Electrical Ground Power Assisted APU Start (3) Starting
	493100 PB 501	APU Isolation Valve Test APU Pump
	710000 PB 201	Start Engine
	720000 PB 201	Start Engine
	740000 PB 501	Operational Test, audible check of the Ignition System to check for correct operation
430	282100 PB 501	Operational Test of Pumps and Pump Low Press Warning
	282200 PB 501	Operational Test of Tank Isolation Valves
	282300 PB 501	Operational Test of Cross Feed Valves
	282400 PB 501	Operational Test of LP Valves
	282600 PB 501	Operational Test of Manual Forward Transfer Control
	282700 PB 501	Operational Test of Trim Tank Pumps
	282800 PB 501	Operational Test of FWD Transfer Mode Operational Test of ACT(s) Fuel Transfer Fault Warning Function by Low Level Test Switch Without ACT(s) Fitted
	284600 PB 501	Operational Test of Tank Level Warning
431	331200 PB 501	General Illumination Adjustment/Test
	331300 PB 501	Instrument and Panel Integral Lighting Adjustment/Test
432	213100 PB 501	Operational Test of the Cabin Pressure Control and Monitoring - Test of Automatic System Controls - Test of Ditching Configuration - Test of Outflow Valves to check MAN Control
	341000 PB 501	BITE Test of ADS 1 (2)
433	261200 PB 501	Engine Fire and Overheat Detection Operational Test
	261500 PB 501	Avionics Compartment Smoke Detection Operational Test
	261600 PB 501	Cargo Compartment Smoke Detection Operational Test
	261900 PB 501	Operational Test of Main Deck Cargo Compartment Smoke Detection
	262100 PB 501	Engine Fire Extinguishing Operational Test
	262300 PB 501	Operational Test of the Percussion Electrical Circuit and Priority Switching
	303100 PB 501	Operational Test of Probe Ice Protection

VU	PB	Test
	304200 PB 501	Operational Test of the Window Temperature Controller
435	351300 PB 601	Oxygen Indicating System Test
	352100 PB 501	Operational Test Cabin Courier Oxygen System
436	331400 PB 501	Reprogrammable Annunciator Light Test
	342800 PB 501	Operational Test of Standby Compass
	361100 PB 501	Operational Test of HP Bleed Valves and Cross Feed Valves from Fire Handle
437	211100 PB 501	Operational Test, check for correct operation of Economic Flow Mode (ECON FLOW)
	215300 PB 501	Operational Test of the Emergency Ram Air Inlet
	216200 PB 501	Operational Test of the Trim Air Control and Overheat Monitoring
	216300 PB 501	Flight Compartment and MDCC Temperature Control
	216400 PB 501	Cargo Compartment Temperature Control
438	212211 PB 401	Test Operation of Fans
	212300 PB 501	Operational Test of the Electronics Rack Air Extraction
	215500 PB 501	Operational Test of Ground Cooling
	215513 PB 401	Test after Installation of Ground Cooling Valve
439	323100 PB 501	Test of Landing Gear Extension and Retraction System Electrical Control and Indicating Circuit
440	731500 PB 501	Test of Fuel Heating
441	216100 PB 501	Operational Test of the Pack Temperature Control
442	237100 PB 501	Operational Test of Cockpit Voice Recorder
	313100 PB 501	Operational Test of AIDS Recorder
444	216400 PB 501	Test Operational of Cold Trim Air Valve 81HN (69HN)
445	216400 PB 501	Test Operational of Cold Trim Air Valve 81HN (69HN)
446	215500 PB 501	Operational Test of Ground Cooling
447	344800 PB 501	Cockpit Self Test
448	216400 PB 501	Test Operation of Cold Trim Air Valve 81HN (69HN)
458	235100 PB 501	Operational Test of Audio Integrating
465	233600 PB 501	Operational Test of Passenger Entertainment
466	344800 PB 501	Operational Test of the GPWS
467	234100 PB 501	Flight Interphone Adjustment/Test
	235100 PB 501	Operational Test of Audio Integrating
468	232400 PB 501	ACARS Adjustment/Test
483	234100 PB 501	Flight Interphone Adjustment/Test
484	234100 PB 501	Flight Interphone Adjustment/Test
	343400 PB 501	Operational Test of Windshield Guidance Display
493	740000 PB 501	Operational Test of Ignition System
494	261900 PB 501	Operational Test of Main Deck Cargo Compartment Smoke Detection
496	231200 PB 501	Operational Test of VHF System
497	344800 PB 501	Operational Test of the EGPWS
498	344800 PB 501	Operational Test of the EGPWS
503	347100 PB 501	Operational Test of Metric Altitude Display

1. Main Instrument Panels - Opening and Closing

A. Captain's and First Officer's Main Instrument Panels 3VU and 5VU
(Ref. Fig. 201)

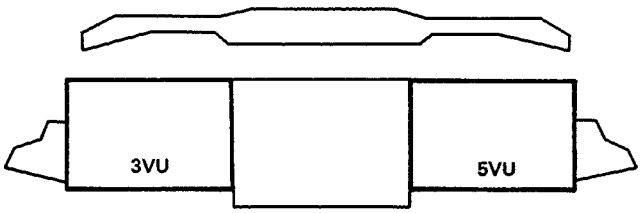
(1) Panel opening
- (a) Loosen the four screws.
- (b) Remove the two safety clips.
- (c) Disengage locks.
- (d) Grip the two handles, pull out main instrument panel.
- (e) Tilt panel by 20° approx. downwards (the panel is then held by retaining cable).

(2) Panel closing
- (a) Check that all electrical connectors are correctly secured and that associated wiring is not subjected to tension.
- (b) Move main instrument panel upwards, push along slide tracks and position it on retaining pins.
- (c) Engage locks on locking pins.
- (d) Install the two safety clips.
- (e) Tighten the four screws.

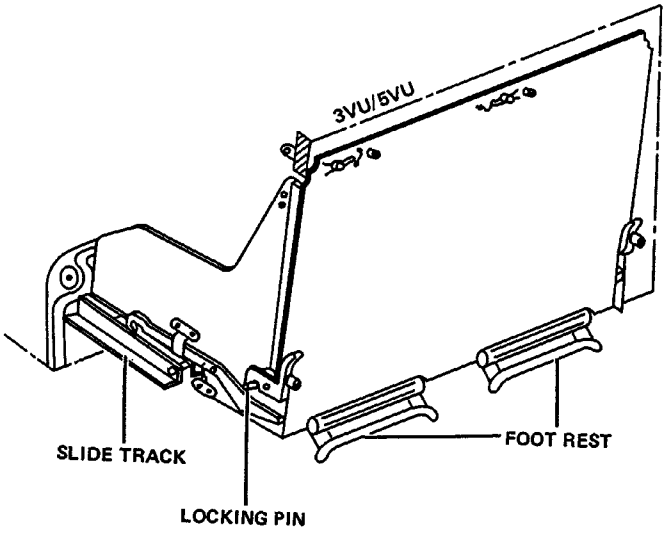
B. Upper Center Instrument Panel 4VU
(Ref. Fig. 202)

(1) Panel opening
- (a) Loosen the six screws.
- (b) Remove the two safety clips.
- (c) Grip the two handles and pull out upper center instrument panel.
- (d) Bring panel into contact with rollers.

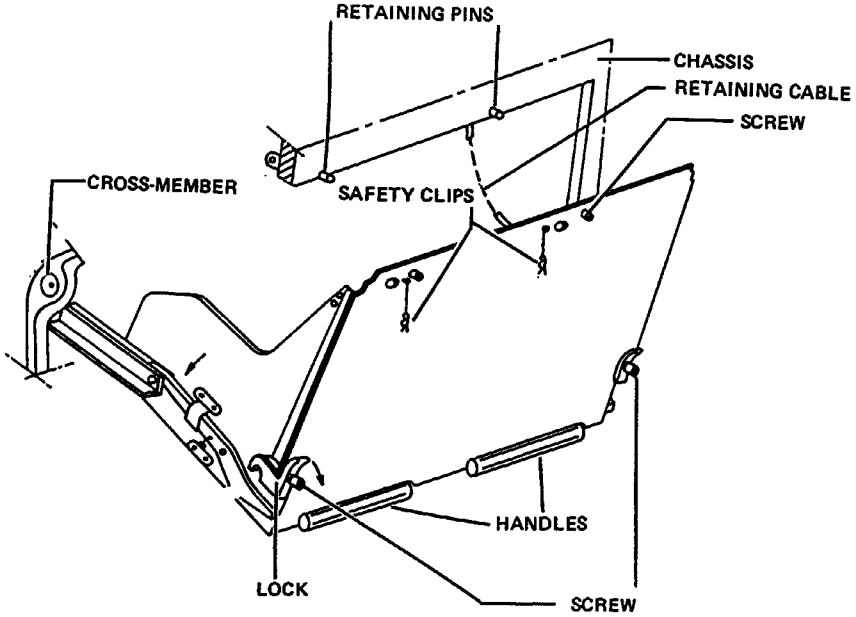
(2) Panel closing
- (a) Check that all electrical connectors are correctly secured and that associated wiring is not subjected to tension.
- (b) Push upper center instrument panel along slide tracks, position it on retaining pins and install the two safety clips.
- (c) Tighten six screws.



CLOSED POSITION

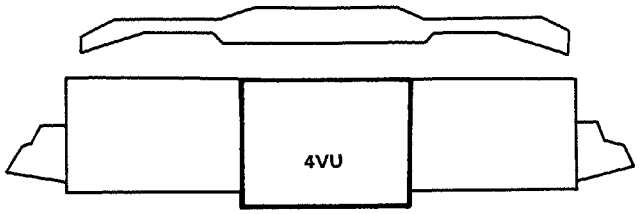


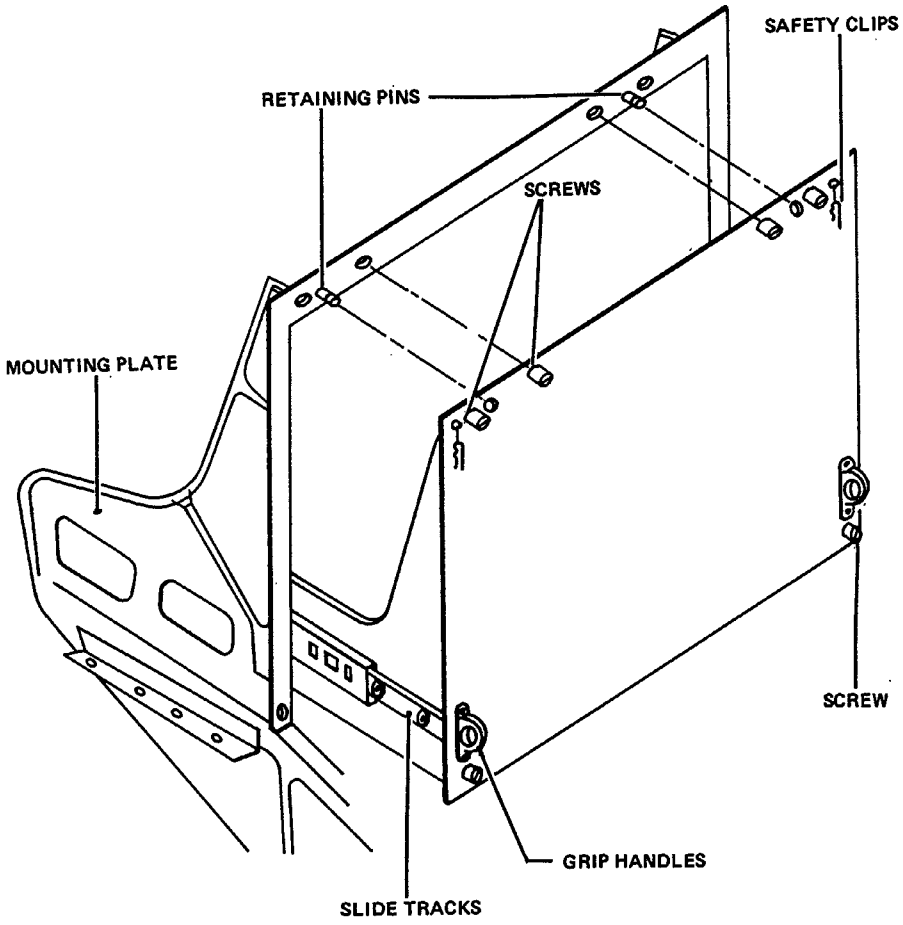
OPEN POSITION



BM5 31 11 00 2 AAM0 00

Captain's and First Officer's Main Instrument
Panels 3VU and 5VU
Figure 201





BM5 31 11 00 2 ACM0 00

Upper Center Instrumemt Panel 4VU
Figure 202

CLOCKS - DESCRIPTION AND OPERATION

1. General

(Ref. Fig. 001)

GMT is provided by two fully independent clocks with built-in time base installed on the aircraft, as follows :

- one clock on Captain's main instrument panel 3VU
- one clock on First Officer's main instrument panel 5VU
- A full provision for one clock is made on the lateral panel 478VU.

The Captain's and First Officer's clock are each associated with a push-button switch, located on the respective control wheels, which serves to control the chronometric function.

Each of the clocks furthermore provides a GMT output in ARINC 429 data bus format for the digital flight data recorder and the two FMC's.

Each clock is powered by two electrical circuits with one circuit directly connected to the aircraft batteries. This enables time to be counted in memory throughout the period that aircraft is parked.

2. Component Location

ELECTRICAL CLOCKS

(Ref. Fig. 002)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
2FS	Clock - F/O	5VU	212		31-21-13
3FS	Clock - Capt	3VU	211		31-21-13
8FS	P/BSW - Remote Control, F/O - Clock	14VU	212		
9FS	P/BSW - Remote Control, Capt - Clock	12VU	211		

A. Clocks

Include :

- GMT display in hours and minutes on a digital counter.
- Elapsed time display (ELAPS) in hours and minutes on a digital counter.
- Chronometer (CHRO) displaying seconds and minutes by means of a sweep hand and a digital counter.
- Date display in lieu of GMT display by action on a pushbutton switch

B. Captain's Controls

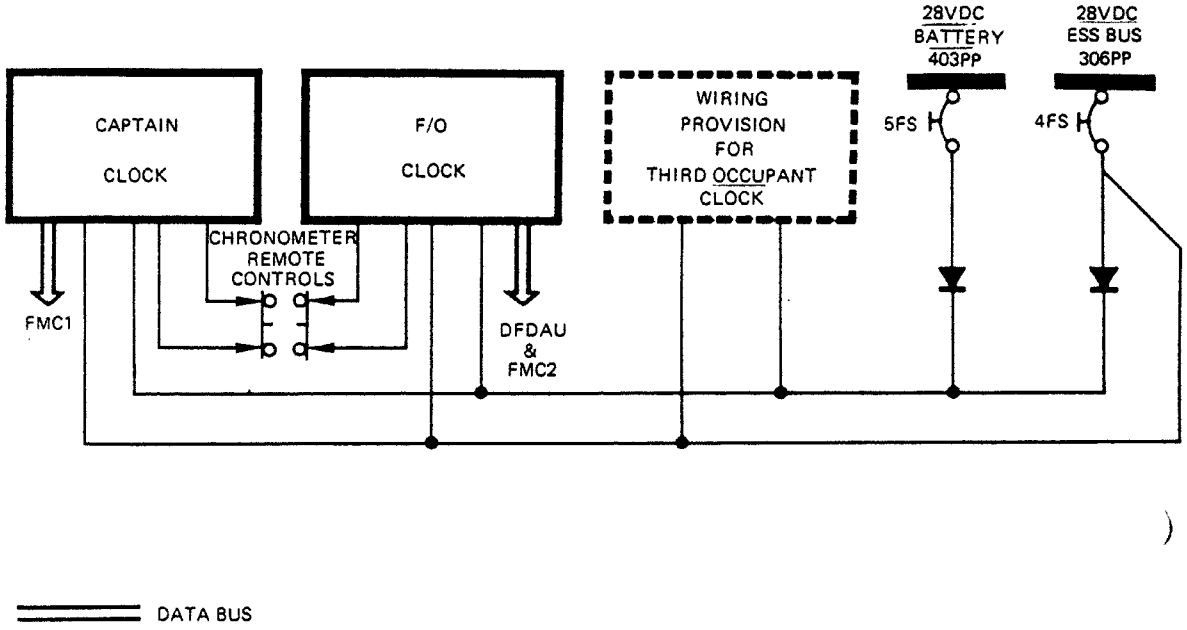
The Captain controls the chronometric function on his clock by means of a pushbutton switch 9FS located on the associated control wheel.

C. First Officer's Controls

The First Officer controls the chronometric function on his clock by means of a pushbutton switch 8FS located on the associated control wheel.

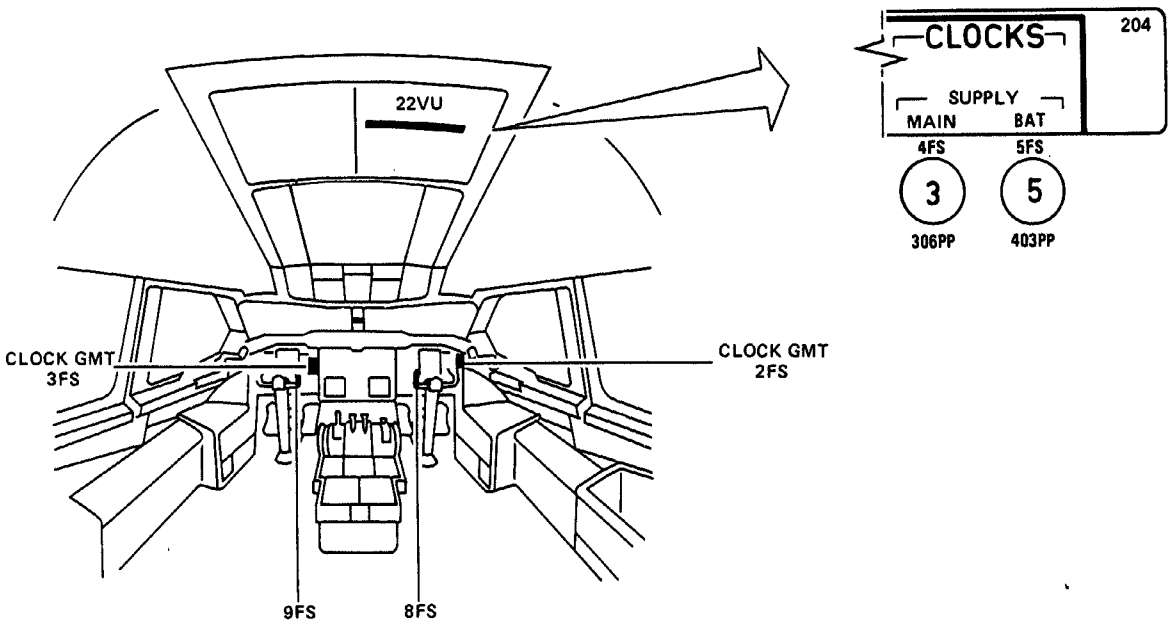
D. Circuit Breakers

Figure 2 depicts the location of the various circuit breakers controlling the system supply circuit.



BM5 31 21 00 0 BAMO
DM5

Electrical Clocks-System
Figure 001



Electrical Clocks - Component Location
Figure 002

3. Description
(Ref. Fig. 003)
(Ref. Fig. 004)

A. Presentation and Operation
This self-contained clock with built-in time base is contained in a 2X4 ATI case and displays the following information :
- GMT
- Elapsed time (ELAPS)
- Chronometer (CHRO)
- Date

and includes the controls associated with each of these functions.
(1)GMT is displayed in digital form by means of four magnetic wheel drums
- two for the hours (item 1)
- two for the minutes (item 3)

A fifth drum displays tens of seconds (item 4)
This readout indicates time up to 23 hrs 59 min.
The GMT selector switch (item 2) may be set to one of the four following positions :
- FAST position = time fast setting (60 mn/s)
- SLOW position = time slow setting (1 mn/s)
- HLD position = time hold
- RUN position = the counter starts.

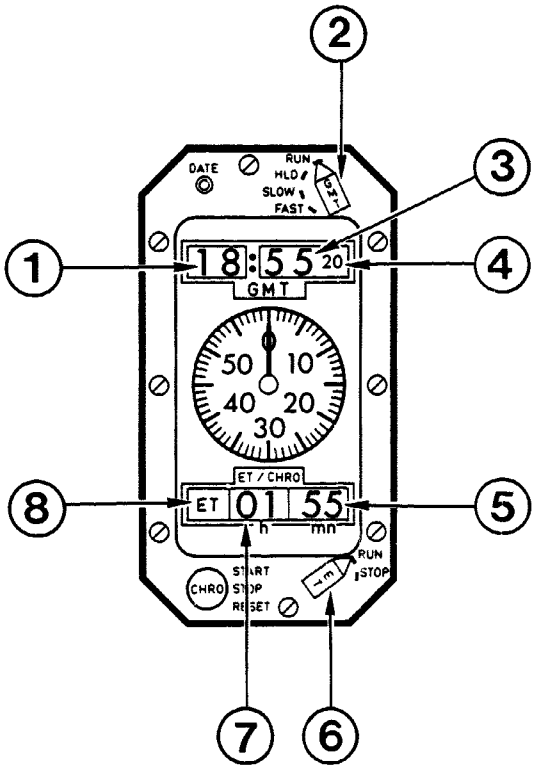
NOTE :
(a)HLD, SLOW and FAST positions may be selected by first pressing then rotating the GMT selector switch.
(b)GMT is provided to the DFDR and FMC1 in form of encoded output.

(2)Elapsed time (ELAPS) is displayed in digital form by means of four magnetic wheel drums
- two for the hours (item 7)
- two for the minutes (item 5)

The elapsed time counter can totalize up to 99 hrs 59 min.
The elapsed time counter is controlled by a 2 stable position selector switch (ET) (item 6).
- STOP : the counter stops,
- RUN : the counter returns to zero and starts running simultaneously.

Initialization of the ELAPS function is indicated by the ET annunciator (item 8).
(3)The chronometric (CHRO) function is achieved by :
- a sweep hand (item 12) which completes one turn in 60 seconds
- a digital counter which consists of two magnetic wheel drums (item 9) totalizing up to 99 min.

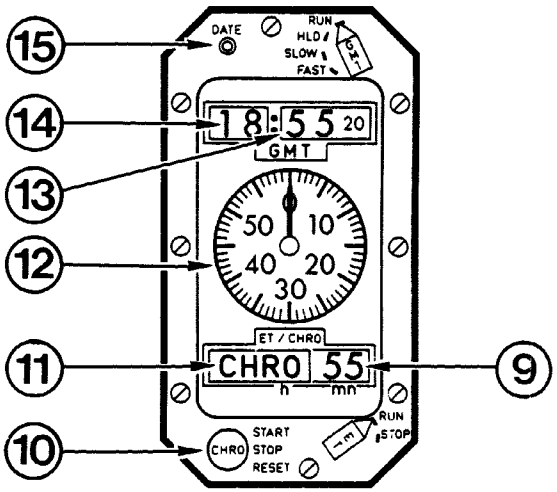
The CHRO function has priority over the ELAPS function if the latter is operating.
The chronometer is controlled by a pushbutton switch (item 10) located in the lower LH corner, or through a remote control pushbutton switch (8FS/9FS) located on the control wheel.
Three sequences can be selected :
- START
- STOP



«ELAPS» CONFIGURATION

8M5 31 21 00 0 REMO

Electrical Clock - Face (1/2)
Figure 003



«CHRONO» CONFIGURATION

BM5 31 21 00 0 RGMO

Electrical Clock - Face (2/2)
Figure 004

- RESET : (to zero) with result that sweep hand returns to zero and elapsed time (ELAPS) is displayed if this function is operating. Initialization of the chronometric (CHRO) function is indicated by the CHRO annunciator (item 11)

Information displayed is accurate to within 1 second per 200 hours.

(4)The date is displayed by means of the DATE pushbutton switch (item 15) located in the upper LH corner.

A pressure on this pushbutton switch causes the GMT display to be replaced by the date. The tens of seconds drum displays 00, the GMT minutes are replaced by the day (item 13), the GMT hours are replaced by the month (item 14). Date setting is performed by means of the GMT selector switch (item 2) which enables in this case the following functions to be achieved :

- in RUN position : the counter starts counting date.
- in HLD position : date hold
- in SLOW position : day setting : 1 day/s (without action on month display)
- in FAST position : month setting : 1 month/s /without action on day display)

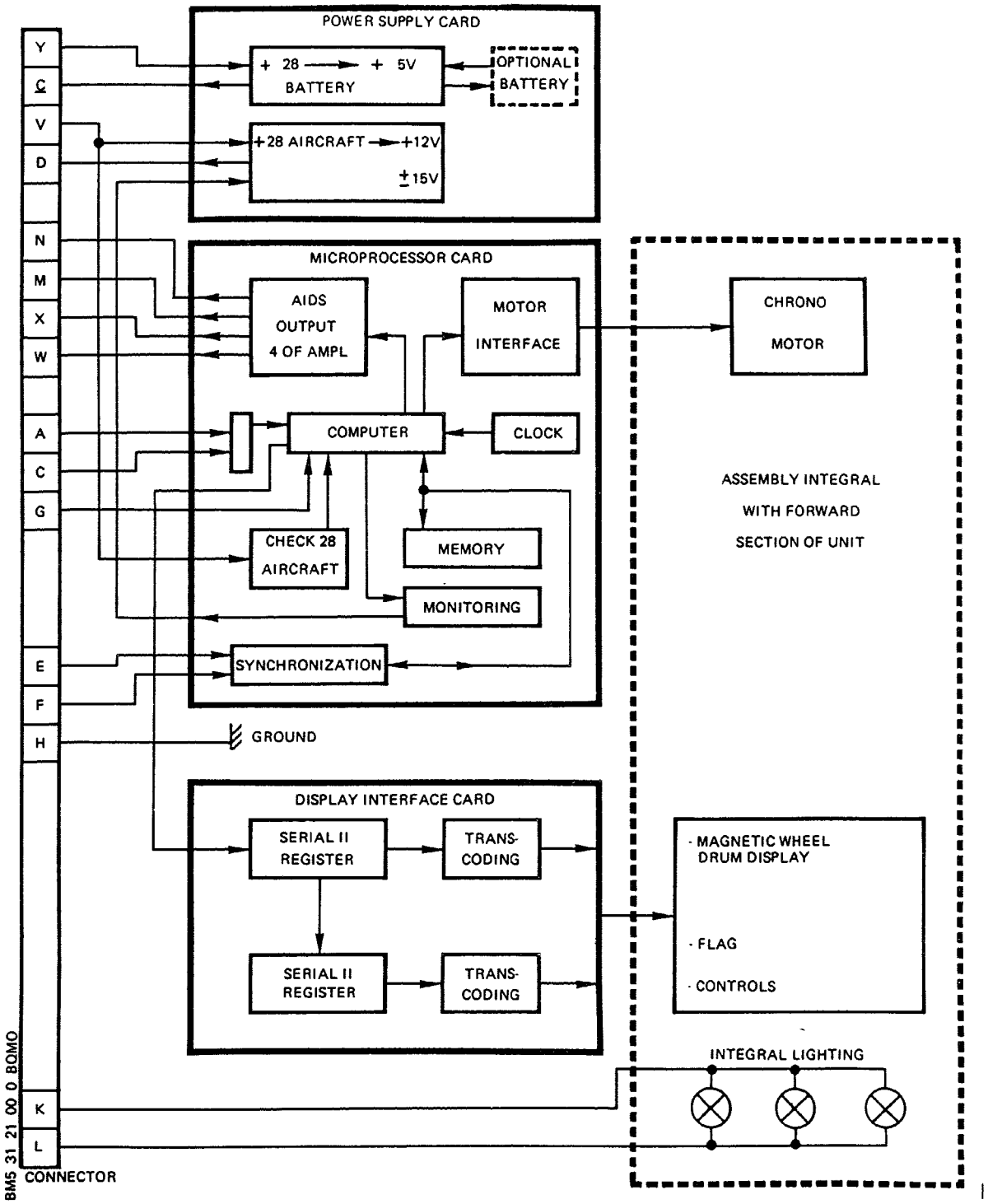
Date display is replaced by GMT display when the DATE pushbutton switch is released.

NOTE : Date is provided to the DFDR and the FMCs in form of encoded output.

B. Internal Arrangement (Ref. Fig. 005)

(Ref. Fig. 005)

The block diagram shows clock internal arrangement.



Electrical Clock - Block Diagram
Figure 005

4. Operation

A. Normal
- Instruments are powered normally.
- Failure warning flag is out of view
- Make certain that the counters display no zero ; otherwise set time by means of the GMT selector switch

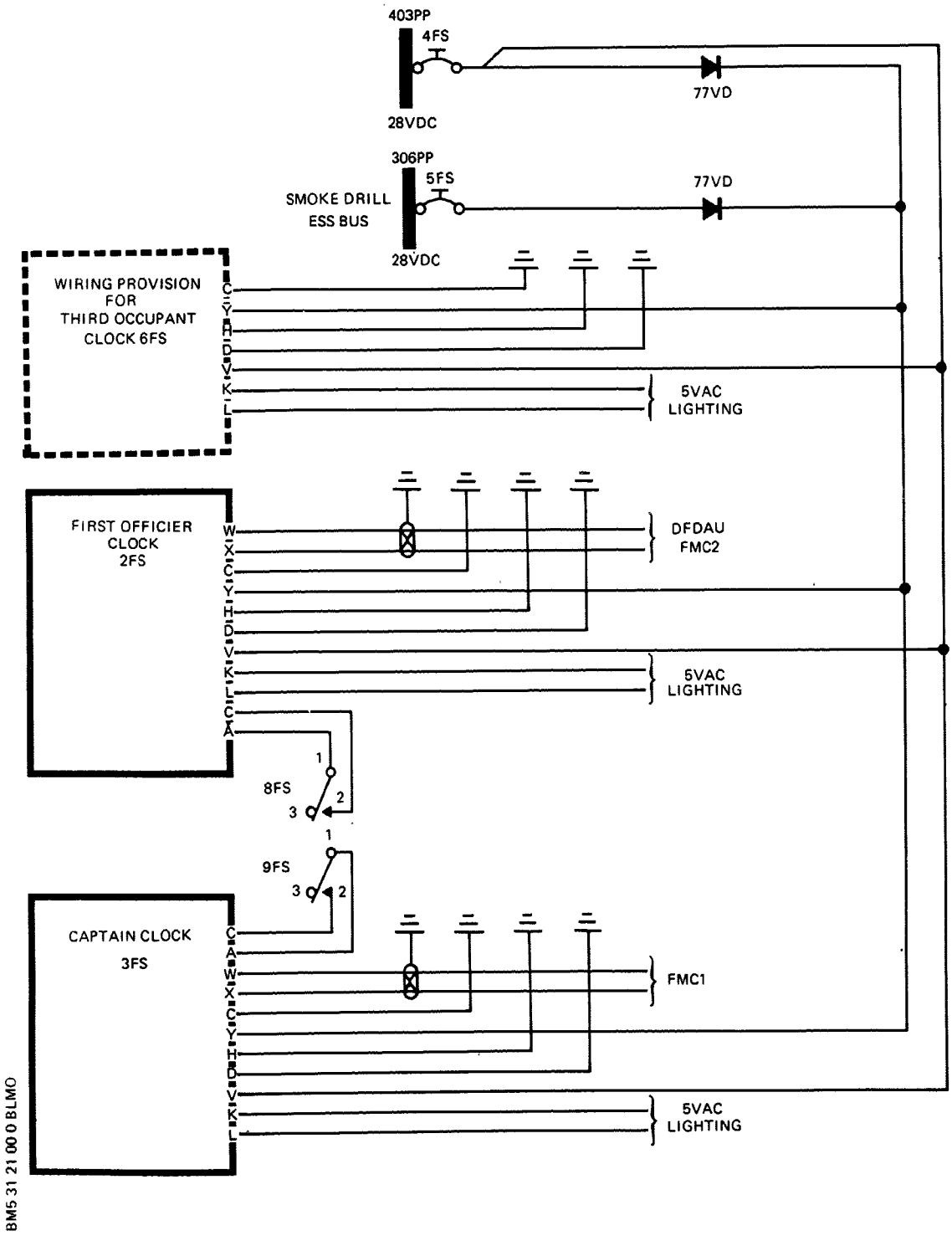
B. Failure
(1)Clock failure
- OFF failure warning flag comes into view.
(2)Electrical power failure
(a)Main power supply failure (aircraft bus) :
- OFF failure warning flag comes into view.
(b)Aircraft battery power failure :
No effect provided that main power is available.

5. Outputs
(Ref. Fig. 006)
The Captain's clock provides GMT outputs for FMC 1.
The First Officer's clock provides GMT outputs in ARINC 429 data bus format for the digital flight data recorder and to FMC 2.
Time is encoded to label 125 in BCD format and label 150 in BNR format.
Date is encoded to label 260 in BCD format.
Equipment identification is encoded to label 377 in HEX format (identification 031)

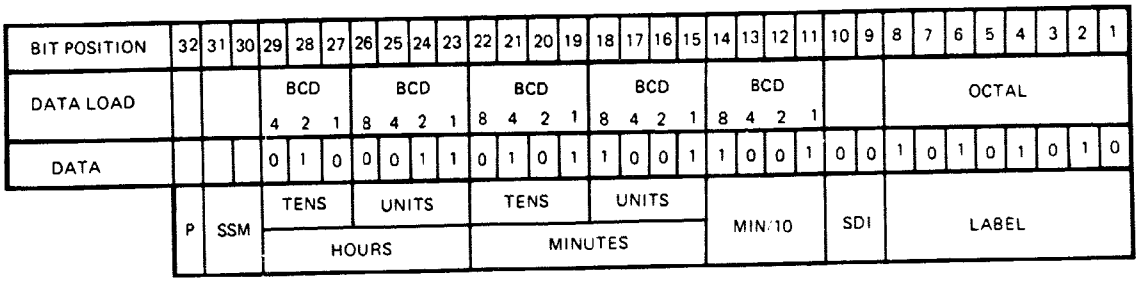
A. Sequence and rating

B. Word Structure

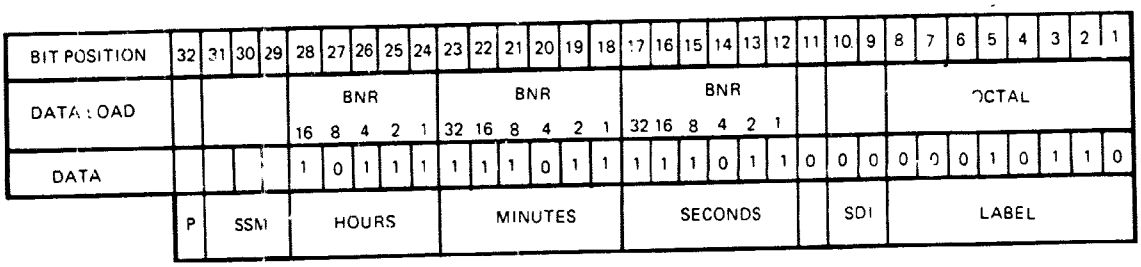
(Ref. Fig. 007)



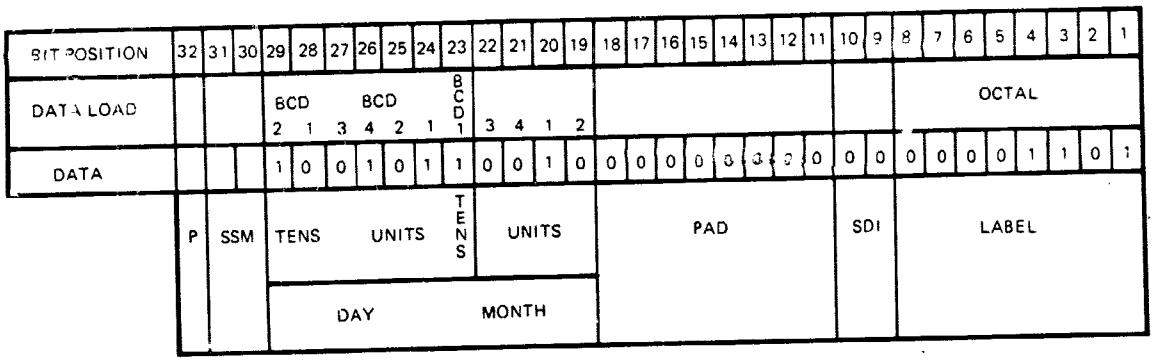
Electrical Clocks - Schematic
Figure 006



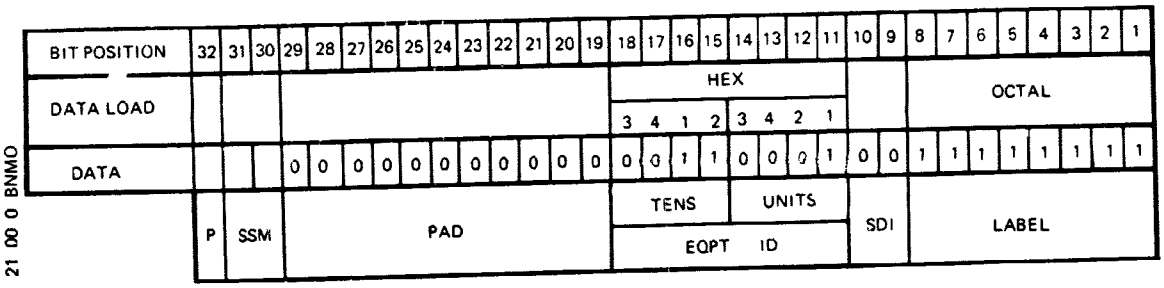
LABEL 125 : GMT - EXAMPLE : 23 H 59 MIN 34 S (BCD)



LABEL 150 : GMT - EXAMPLE : 23 H 59 MIN 59 S (BNR)



LABEL 260 - DATE - EXAMPLE DECEMBRE 25 (BCD)



LABEL 377 - EQUIPMENT IDENTIFICATION - EXAMPLE : 31 (BCD)

BM5 31 21 00 0 BNMO

Word Structure Label
Figure 007

1. Clock Setting

A. Reason for the Job
The clock can be adjusted according to the other clock or using an external clock showing the correct time.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	External Clock
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

C. Procedure
WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.
R NOTE 1 : Aircraft batteries are sufficient to perform the test.
R NOTE 2 : For a leap year, on 29 February, it is possible to change the
R actual setting of the clock from "01 03" to "29 02". You must do
R this before the first flight of the day. The next day (1 march),
R the clock will automatically show "01 03".

(1)Job set-up
- Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
- Make certain that electronics racks ventilation is correct.
- Close overhead panel circuit breakers particularly those associated with CLOCKS.

(2)Adjustment

ACTION	RESULT
1. On clock face, press then rotate GMT selector switch to select FAST position.	Leave in FAST position until GMT hour display reaches actual hours on reference clock.
2. Place GMT selector switch in SLOW position	Leave in SLOW position until GMT min reaches actual figure on reference clock plus one.
3. If time shown is slightly ahead of actual time, place GMT selector switch in HOLD position	Time is frozen.
4. When reference clock reaches a round figure (00 second) restart clock by placing selector switch in RUN position.	The hour and minute drums display correct time while the fifth drum displays tens of seconds.
5. Press and hold DATE pushbutton switch	

ACTION	RESULT
throughout steps 6, 7 and 8	
6. Place GMT selector switch in FAST position. Leave in FAST position until month display corresponds to month selected.	The left drums count (1 month/sec.) without affecting day display.
7. Place GMT selector switch in SLOW position. Leave in SLOW position until day display corresponds to day selected.	The right drums count (1 day/sec) without affecting month display.
8. Place GMT selector switch in RUN position then release DATE push-button switch.	Present GMT is displayed including hours, minutes and tens of seconds counting steadily.

(3)Close-up
(a)De-energize the aircraft electrical network
(Ref. 24-41-00, P. Block 301).
(b)Restore aircraft systems to normal operating condition.

2. Operational Test

A. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

B. Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

NOTE : Aircraft batteries are sufficient to perform the test.

(1)Job set-up

(a)Initial Conditions

- Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
- Make certain that electronics racks ventilation is correct.
- Close overhead panel circuit breakers, particularly those associated with CLOCKS.

(2)Test

ACTION	RESULT
1. On clock face, place GMT selector switch in RUN position	On clock face, check that OFF flag is out of view. Time is counting in GMT display.
2. Press then rotate GMT selector switch to select HOLD position	Time display is frozen.
3. Place GMT selector switch in SLOW position	Time setting is slow.
4. Place GMT selector switch in FAST position.	Time setting is fast.
5. Prior to place GMT selector switch in RUN position, set time	GMT display displays GMT.
6. Press DATE pushbutton switch located in the left upper corner	Tens of seconds drum displays 00. The minutes drums display the day, the hours drums display the month.
7. Place ET selector switch in STOP position	In ET/CHRO display, time is frozen.
8. Place ET selector switch in RUN position.	ET annunciator comes into view. The elapsed time counter returns to zero and starts counting immediately.

ACTION	RESULT
9. Press CHRO pushbutton switch once	In ET/CHRO display, CHRO annunciator comes into view. The counter drums display minutes. The chronometer sweep hand starts sweeping.
10. Press CHRO pushbutton swith a second time	The sweep hand stops and minutes display is frozen.
11. Press CHRO pushbutton switch a third time	The sweep hand returns to zero. CHRO annunciator is replaced by ET annunciator and elapsed time is counted and displayed by the four drums.
12. Repeat steps 9, 10 and 11 using the relevant remote control pushbutton switch on the control wheel (8FS for First Officer's clock and 9FS for Captain's clock)	

(3) Close-up
  (a) De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
  (b) Restore aircraft systems to normal operating condition.

GMT CLOCKS (2FS, 3FS) - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure - 31-21-00, P. Block 501	Electrical Clocks

(Ref. Fig. 401)

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
22VU	CLOCKS/SUPPLY/MAIN	4FS	204/F20
22VU	CLOCKS/SUPPLY/BAT	5FS	204/F21
132VU	LIGHTING-INTEGRAL LT-MAIN PNL AND GLARE SHLD	1LF	322/N76

B. Removal

(1)Loosen but do not remove the two locking screws (6) from clamp (2).
(2)Pull out clock (4) to gain access to connector (3).
(3)Disconnect and cap electrical connector (3).
(4)Cap receptacle (5) of clock (4)
(5)Remove clock (4)

C. Installation

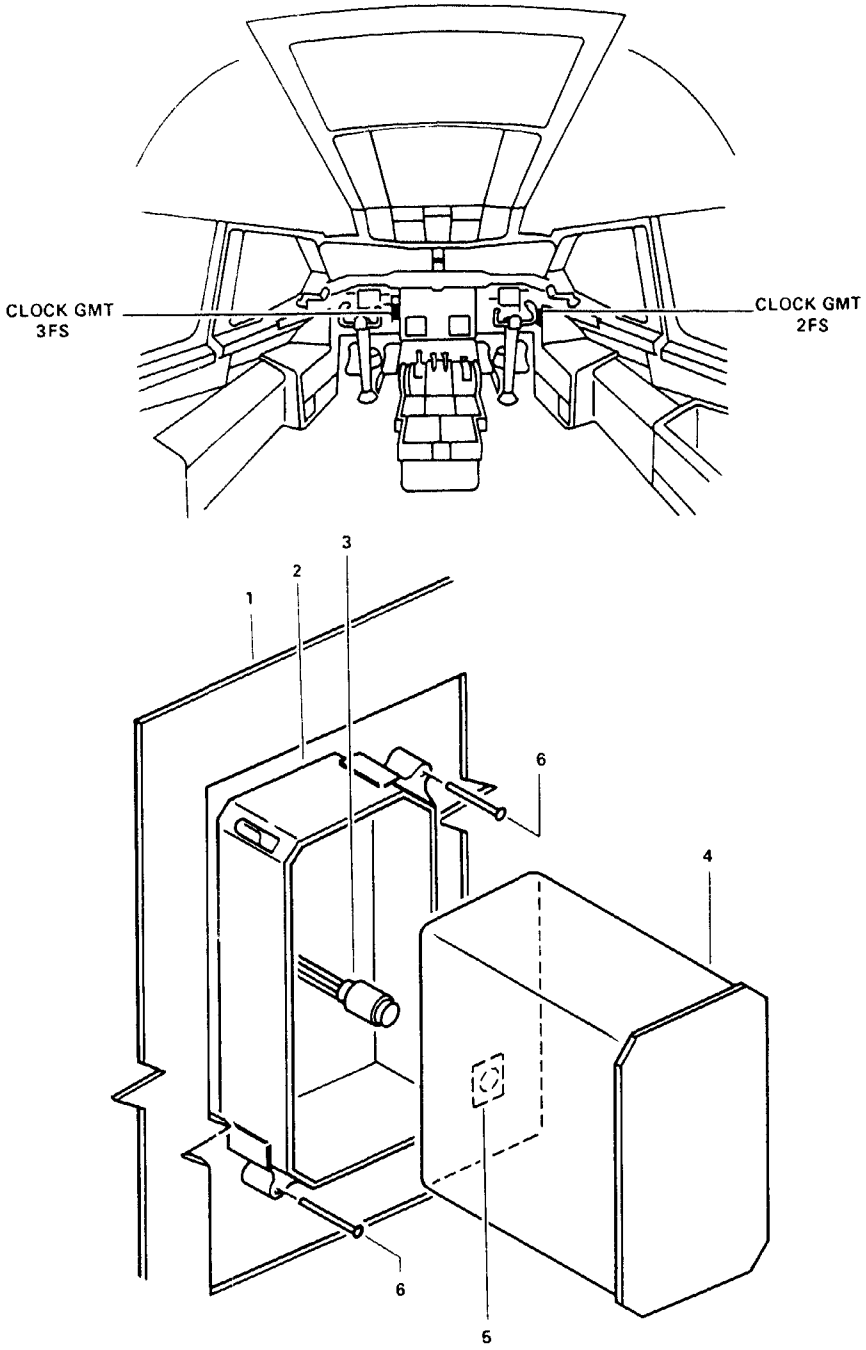
(1)Clean and inspect clock (4) interface and/or adjacent area.
(2)Remove blanking caps from electrical connector (3) and receptacle (5).
(3)Position clock (4) in clamp.
(4)Connect electrical connector (3) to clock (4)
(5)Install clock (2FS or 3FS) on First Officer's or Captain's main instrument panel (1).
(6)Tighten screws (6).
(7)Remove safety clips and tags and close circuit breakers 1LF, 4FS and 5FS.

D. Test

Carry out operational test of clocks (Ref. 31-21-00, P. Block 501)

E. Close-Up

Make certain that working area is clean and clear of tools and miscellaneous items of equipment.



BM5 31 21 13 4 SRM2 12 08
DM5

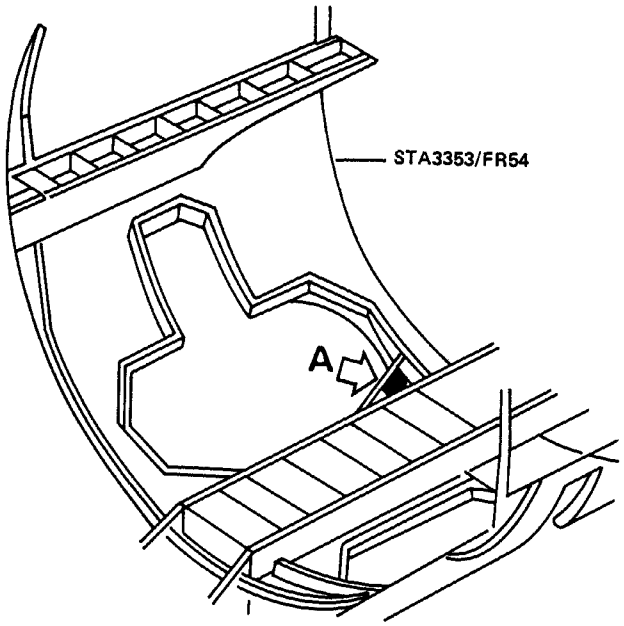
GMT Clocks
Figure 401

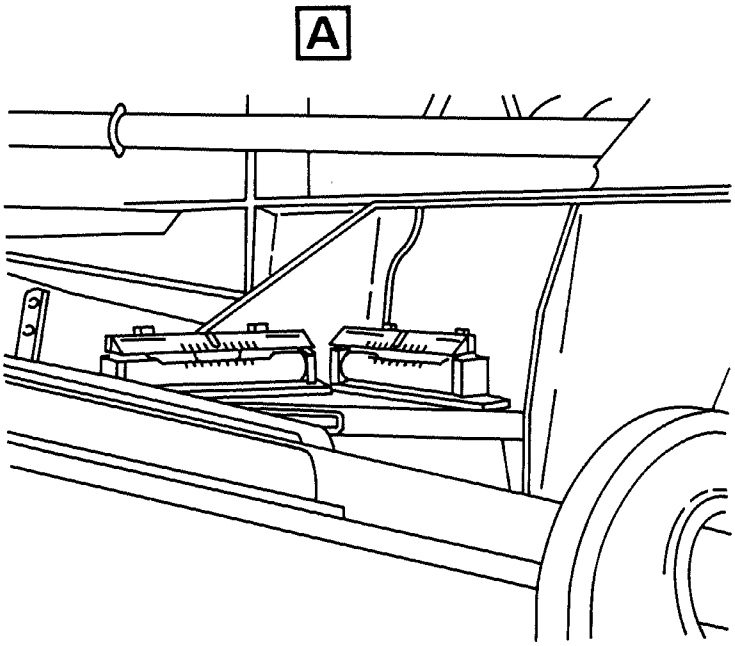
CLINOMETERS - DESCRIPTION AND OPERATION

1. General

(Ref. Fig. 001)

Two clinometers are fitted in the right main landing gear well ; the clinometers indicate the slope of aircraft longitudinal and transverse axes when the aircraft is jacked up.





BM5 31 23 00 0 TGJ2 15 08
DM5

Clinometers
Figure 001

CLINOMETERS - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform 2 m (6 ft. 7 in.)

(Ref. Fig. 401)

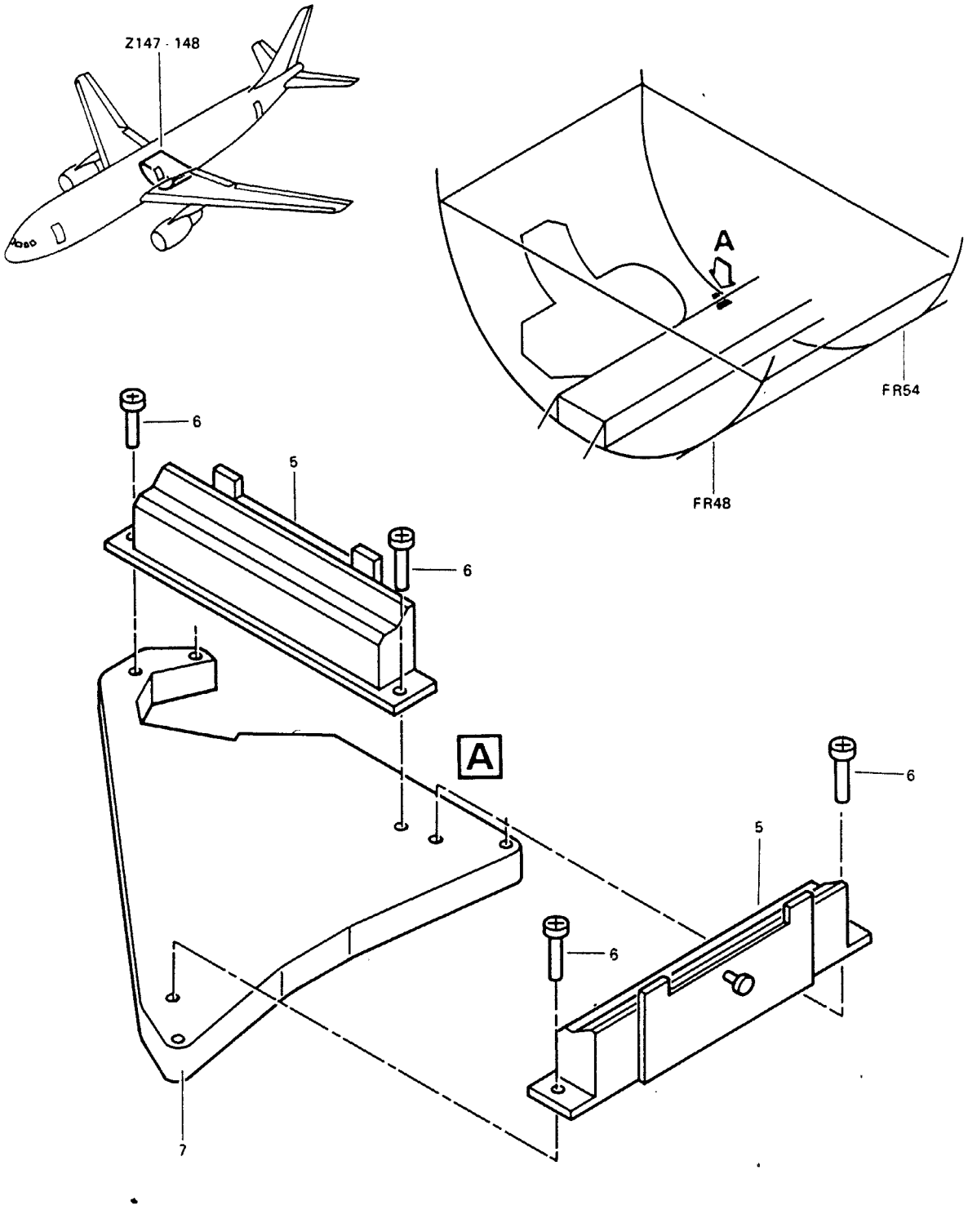
2. Procedure

A. Job Set-Up
Position access platform at main gear well.

B. Removal
Remove clinometers (5) installed in main gear well. Remove screws (6).

C. Installation
(1)Clean and inspect clinometer interface and/or adjacent area.
(2)Position main gear well clinometer (5) on mounting plate (7). Install screws (6) and tighten.

D. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Remove access platform.



BM5 31 23 11 4 ABM2

Clinometer in Main Gear Well
Figure 401

RECORDERS - DESCRIPTION AND OPERATION

1. General
   The main function of **AIDS** is to convert various critical flight parameters into a recordable form and to record them on magnetic tape. Also additional data is sampled to monitor the condition of the connected aircraft systems. The system design covers the **Basic AIDS**. This includes the units and parameters which are necessary for the mandatory requirements and an additional part to customize the installation for different operators.
   The installation is designed in compliance with **ARINC 717**.

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

RECORDERS - DESCRIPTION AND OPERATION

1. General
   The main function of **AIDS** is to convert various critical flight parameters into a recordable form and to record them on magnetic tape. Also additional data is sampled to monitor the condition of the connected aircraft systems. The system design covers the **Basic AIDS**. This includes the units and parameters which are necessary for the mandatory requirements and an additional part to customize the installation for different operators.
   The installation is designed in compliance with **ARINC 717**.
   The functional features realized in the expanded **AIDS** are:
   - acquisition of various analog, discrete and digital parameters,
   - conversion of parameters in a recordable form,
   - recording of formatted data on **DFDR (SSFDR)**,
   - acquisition of digital parameters,
   - monitoring functions of **APU**,
   - printout of primary data and processing results,
   - execution of onboard engine condition monitoring **(ECM)**,
   - initiation of data reports for maintenance and engineering investigations.

   **ON A/C 101-200,

2. Component Location
   (Ref. Fig. 001)

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

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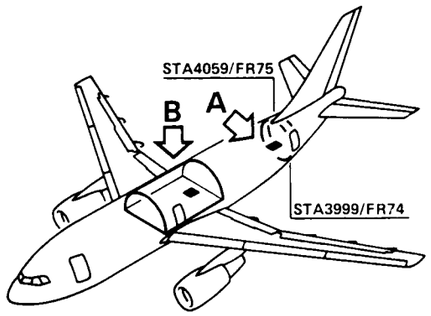
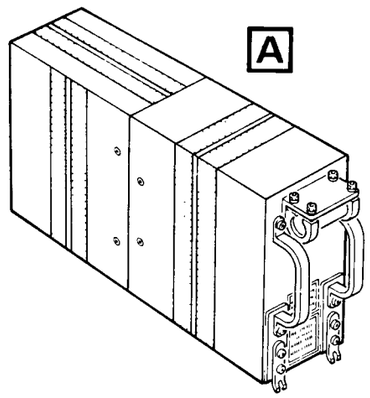
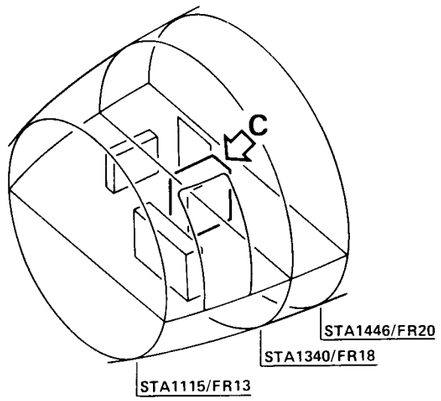
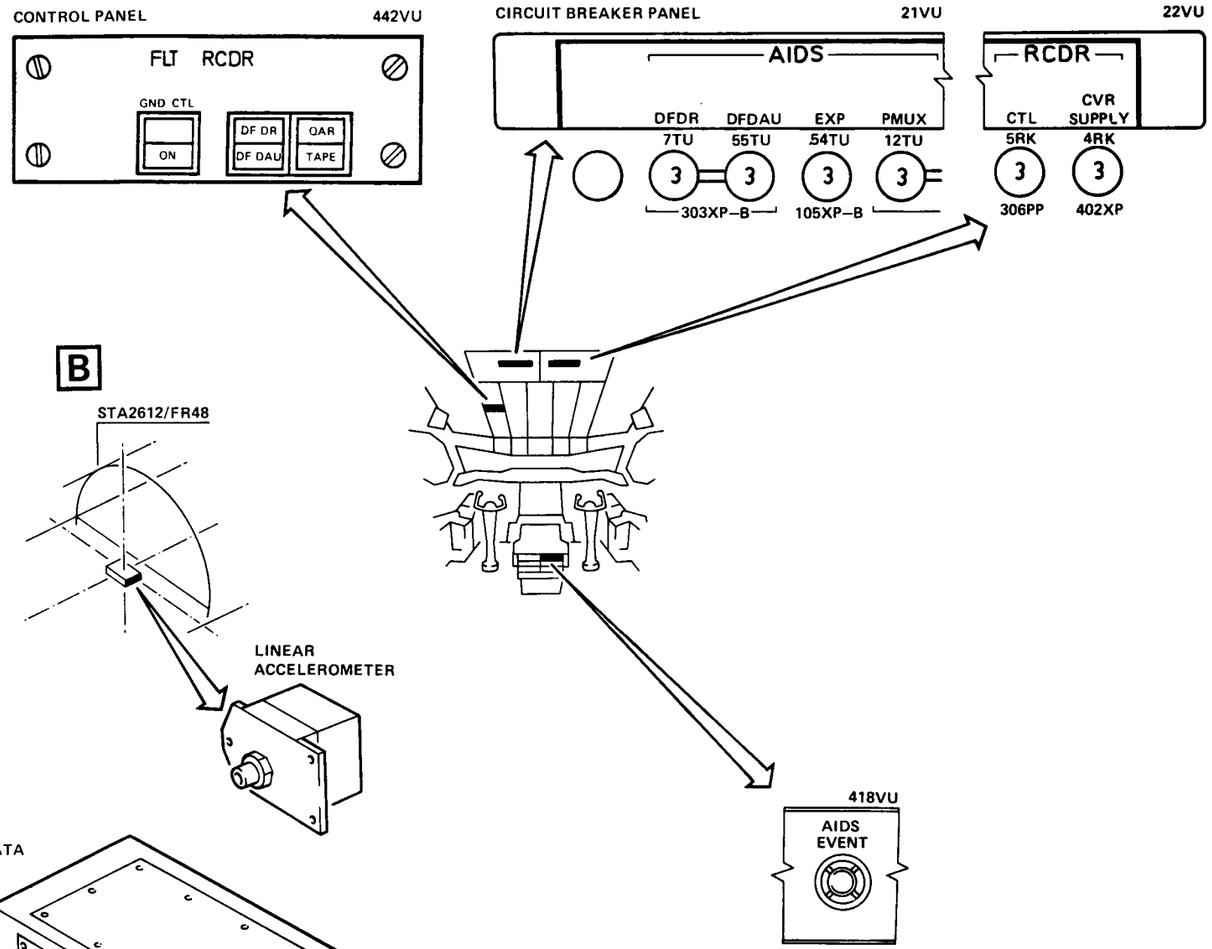




DIGITAL FLIGHT
DATA RECORDER





BM6 31 30 00 0 ABMO 00

AIDS Component Location
Figure 001

EFFECTIVITY: 101-200,

R

PIA

R Post SB 31-2117 For A/C 101-104,

(Ref. Fig. 002)

**ON A/C 101-200,

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
1TU	DFDR		171		31-31-35
2TU	DFDAU	94VU	122		31-31-15
6TU	LA		145		31-31-16
	CTL PNL	442VU	210		

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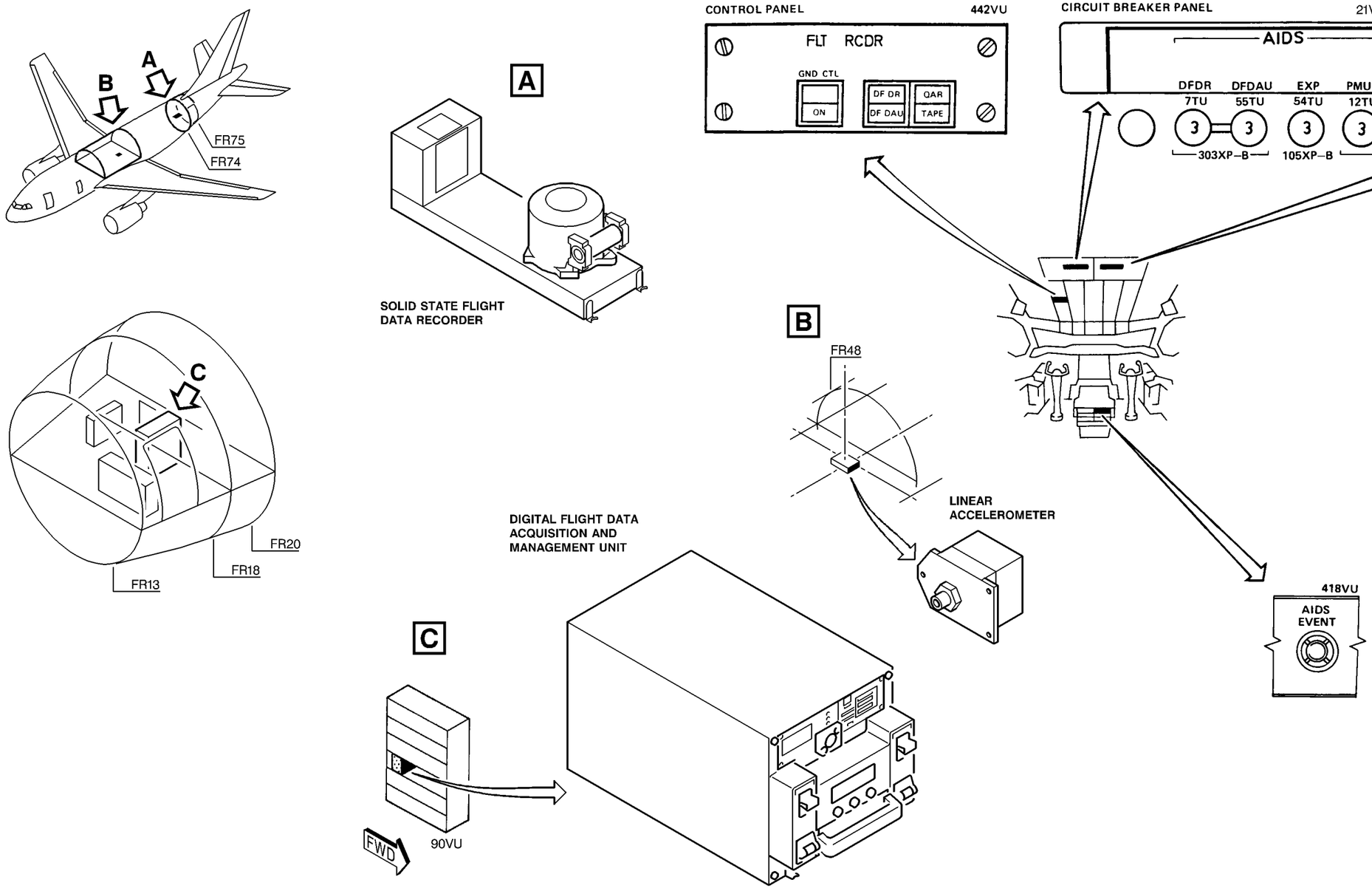


BM6 31 30 00 0 BAD0 00

AIDS Component Location
Figure 002

3. System Description

A. DFDAU is installed in the RH electronics rack. The CTL PNL is located on the overhead panel. The DFDR is installed in the pressurized area of the rear fuselage and LA in the center fuselage.

(1)The DFDAU is connected to various aircraft systems. Data is received in analog, discrete and digital form. The DFDAU collects these parameters and converts them for internal processing.
A standardized set of flight critical parameters is transmitted in serialized digital form to the DFDR . These parameters are stored in the recorders in data frame cycles.
A separate linear accelerometer is installed to provide the DFDAU with acceleration data appearing in the center of gravity.

(2)The DFDR and DFDAU status indicators and the button for override of power interlock are located on the CTL PNL.

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
1TU	SSFDR		171		31-31-35
2TU	DFDAMU	94VU	122		31-31-15
6TU	LA		145		31-31-16
	CTL PNL	442VU	210		

3. System Description

A. DFDAMU is installed in the RH electronics rack. The CTL PNL is located on the overhead panel. The SSFDR is installed in the pressurized area of the rear fuselage and LA in the center fuselage.

(1)The DFDAMU is connected to various aircraft systems. Data is received in analog, discrete and digital form. The DFDAMU collects these parameters and converts them for internal processing.
A standardized set of flight critical parameters is transmitted in serialized digital form to the SSFDR . These parameters are stored in the recorders in data frame cycles.
A separate linear accelerometer is installed to provide the DFDAMU with acceleration data appearing in the center of gravity.

(2)The SSFDR and DFDAMU status indicators and the button for override of power interlock are located on the CTL PNL.

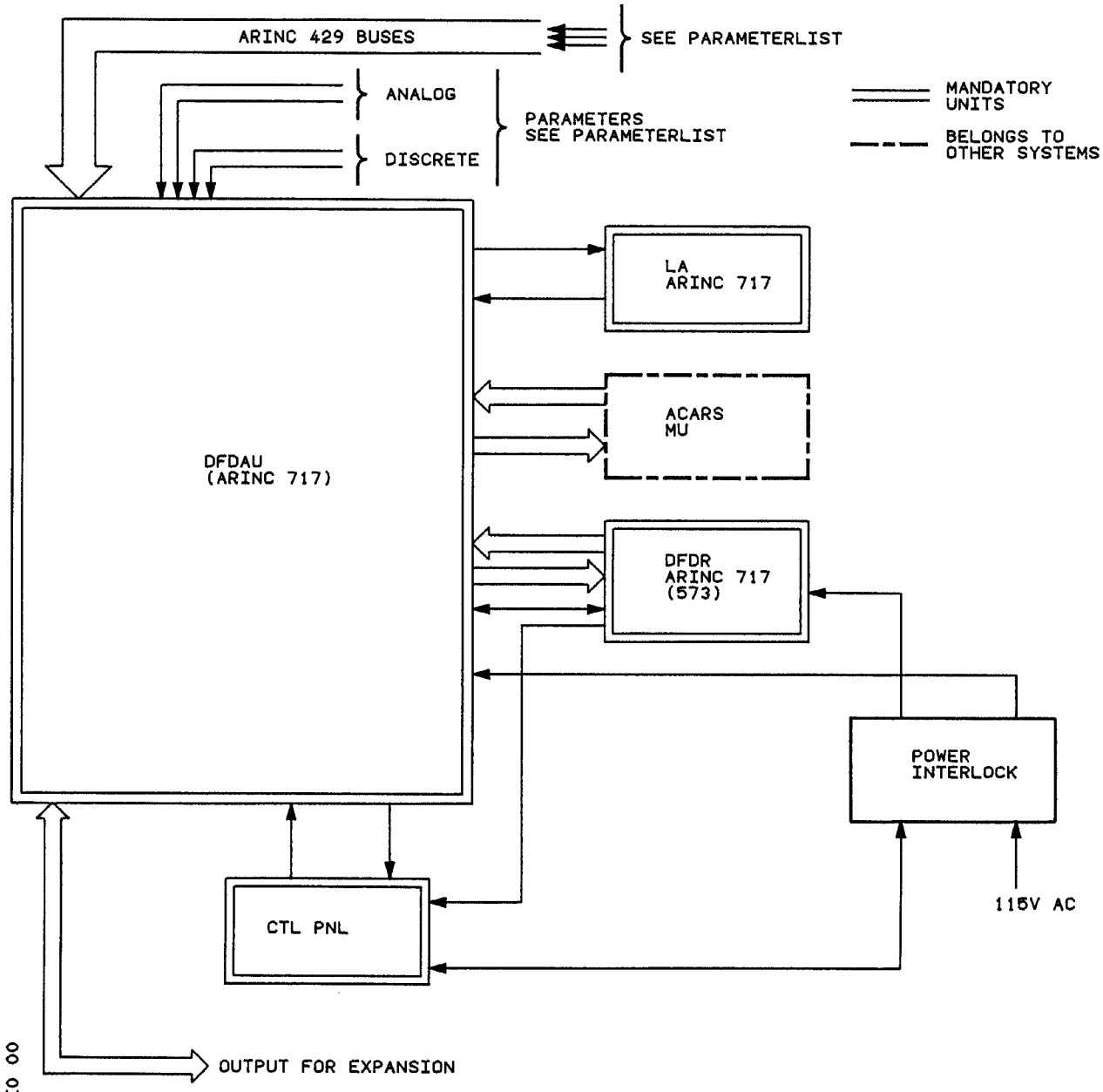
**ON A/C 101-200,

(Ref. Fig. 003)

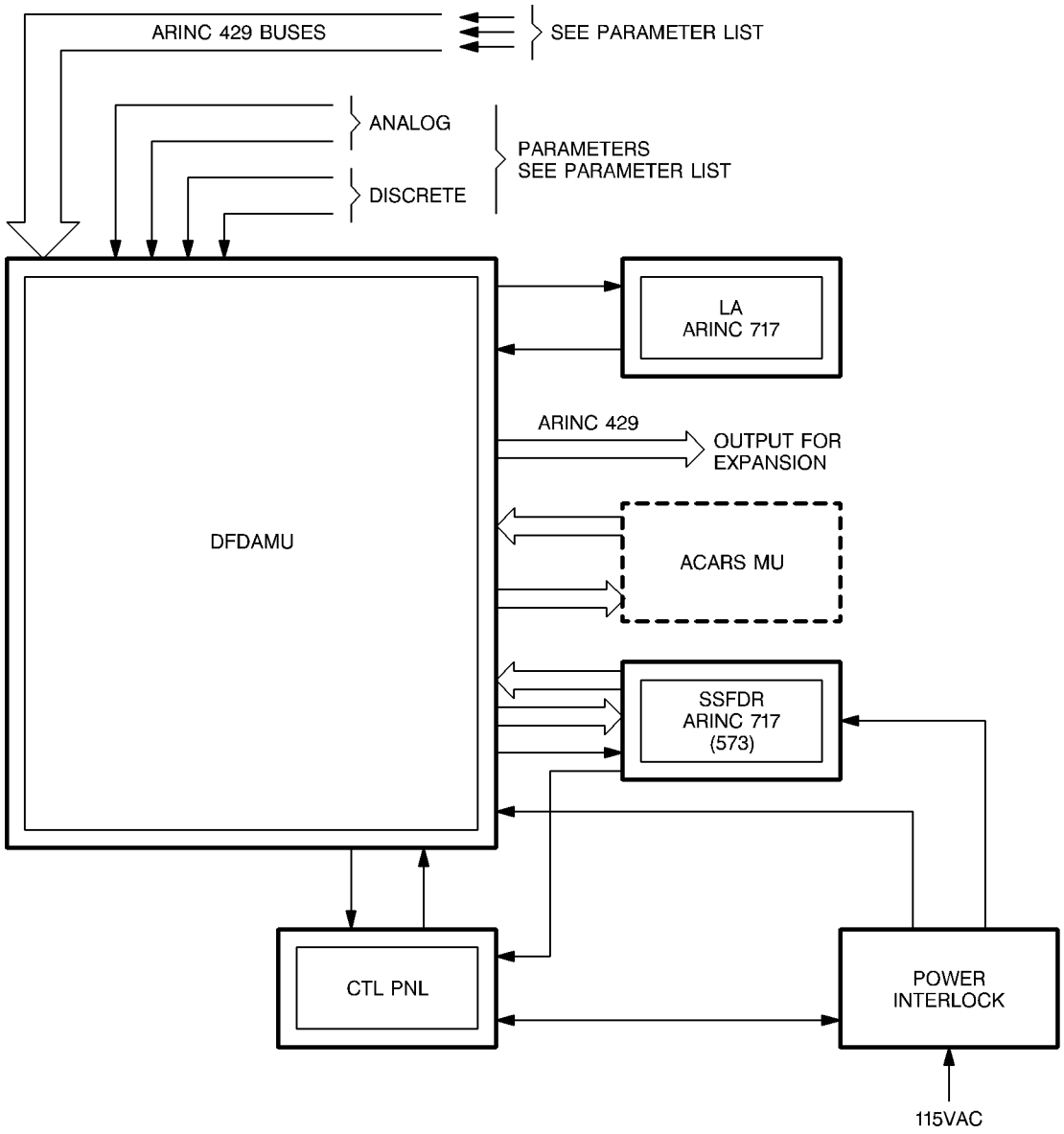
R **ON A/C 101-104,

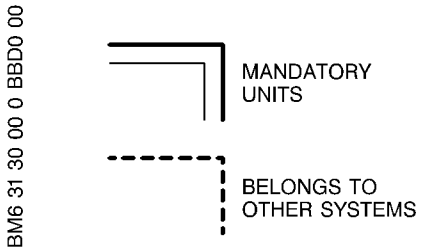
R Post SB 31-2116 For A/C 101-104,

(Ref. Fig. 004)



AIDS Block Diagram
Figure 003





BM6 31 30 00 0 BBD0 00

AIDS Block Diagram
Figure 004

R EFFECTIVITY: 101-104,

PIA

R

1. General

The main function of **AIDS** is to convert various critical flight parameters into a recordable form and to record them on magnetic tape. Also additional data is sampled to monitor the condition of the connected aircraft systems. The expanded system design covers the basic **AIDS**, to fulfil the mandatory requirements, plus additional units for extended onboard data acquisition, evaluation, printing and recording. The installation is designed in compliance with **ARINC 717**.

The functional features realized in the expanded **AIDS** are:

- acquisition of various analog, discrete and digital parameters,
- conversion of parameters in a recordable form,
- recording of formatted data on **SSFDR**,
- acquisition of digital parameters,
- recording of formatted data on **QAR**,

2. Component Location

(Ref. Fig. 001)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
1TU	SSFDR		171		31-31-35
2TU	DFDAU	94VU	122		31-31-15
6TU	LA		145		31-31-16
	CTL PNL	442VU	210		
56TU	QAR	82VU	121		31-32-65

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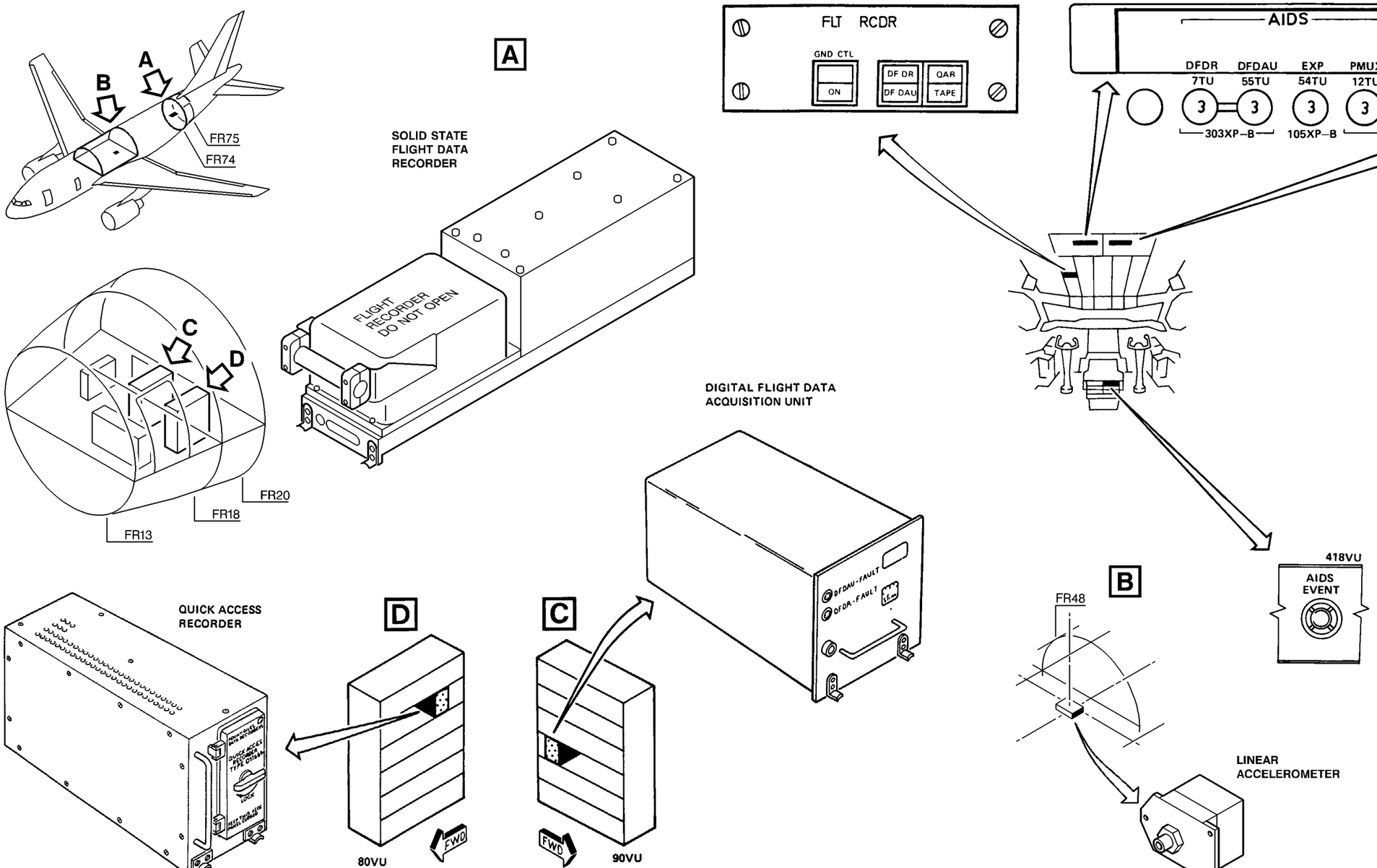

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R

AIDS Component Location
Figure 001

R **ON A/C 004-100,

3. System Description
A. DFDAU and QAR are installed in the electronics rack. The CTL PNL is located
R on the overhead panel. The SSFDR is installed in the pressurized area of the rear fuselage and LA in the center fuselage.
(1)The DFDAU is connected to various aircraft systems. Data is received in analog, discrete and digital form. The DFDAU collects these parameters and converts them for internal processing.
A standardized set of flight critical parameters is transmitted in
R serialized digital form to the SSFDR and the QAR. These parameters are stored in the recorders in data frame cycles.
A separate linear accelerometer is installed to provide the DFDAU with acceleration data appearing in the center of gravity.
R (2)The SSFDR and DFDAU status indicators and the button for override of power interlock are located on the CTL PNL.

R **ON A/C 001-003,

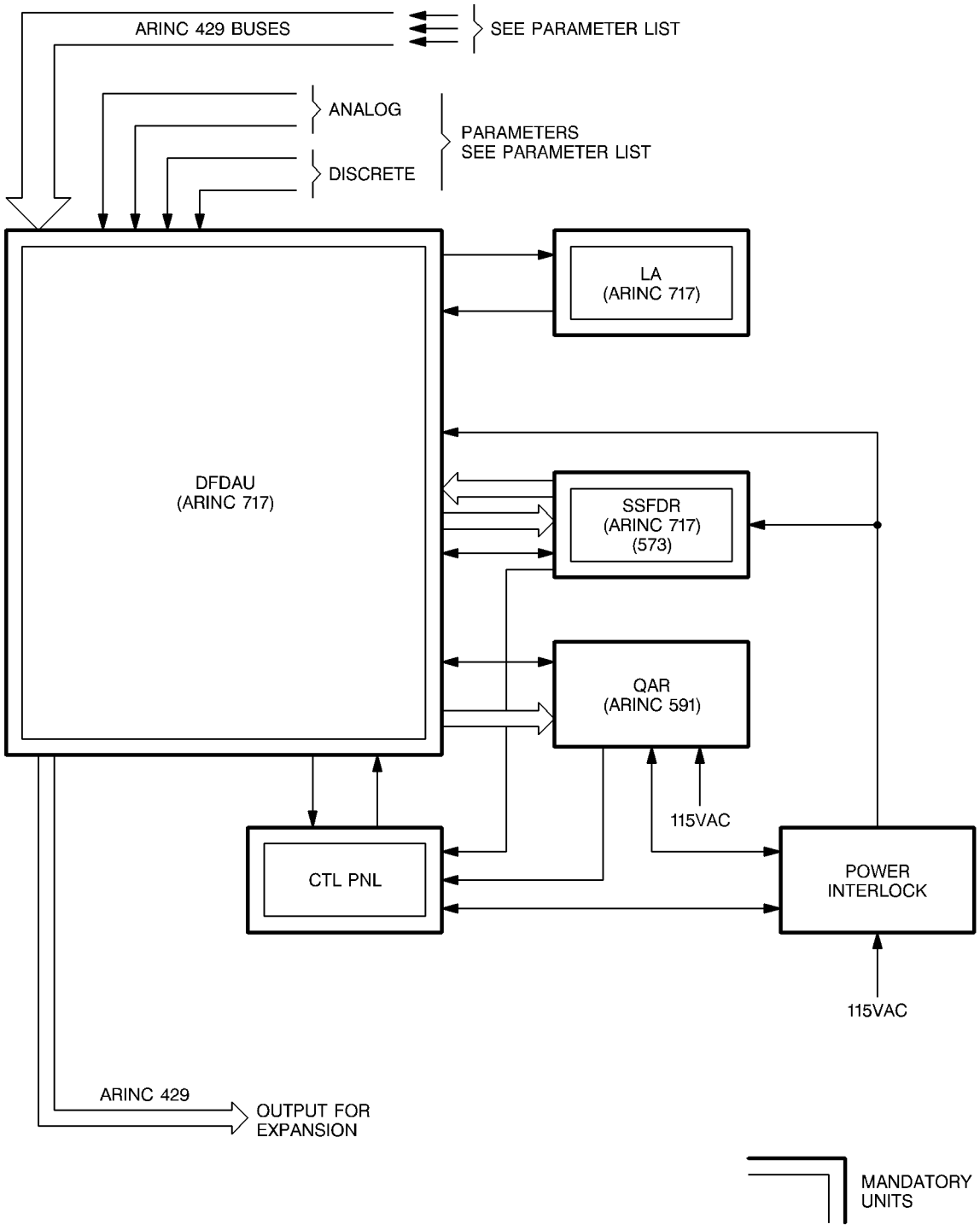
R 3. System Description
R A. DFDAU and QAR are installed in the electronics rack. The CTL PNL is located
R on the overhead panel. The SSFDR is installed in the pressurized area of
R the rear fuselage and LA in the center fuselage.
R (1)The DFDAU is connected to various aircraft systems. Data is received in
R analog, discrete and digital form. The DFDAU collects these parameters
R and converts them for internal processing.
R A standardized set of flight critical parameters is transmitted in
R serialized digital form to the SSFDR and the QAR. These parameters are
R stored in the recorders in data frame cycles.
R A separate linear accelerometer is installed to provide the DFDAU with
R acceleration data appearing in the center of gravity.
R Data is transmitted to the ACARS MU via file transfer protocal according
R to ARINIC 724-2 communications requirements. The evaluated data is down-
R linked via the MU to the ground station.
R (2)The SSFDR and DFDAU status indicators and the button for override of
R power interlock are located on the CTL PNL.

R **ON A/C 004-100,

R (Ref. Fig. 002)

R **ON A/C 001-003,

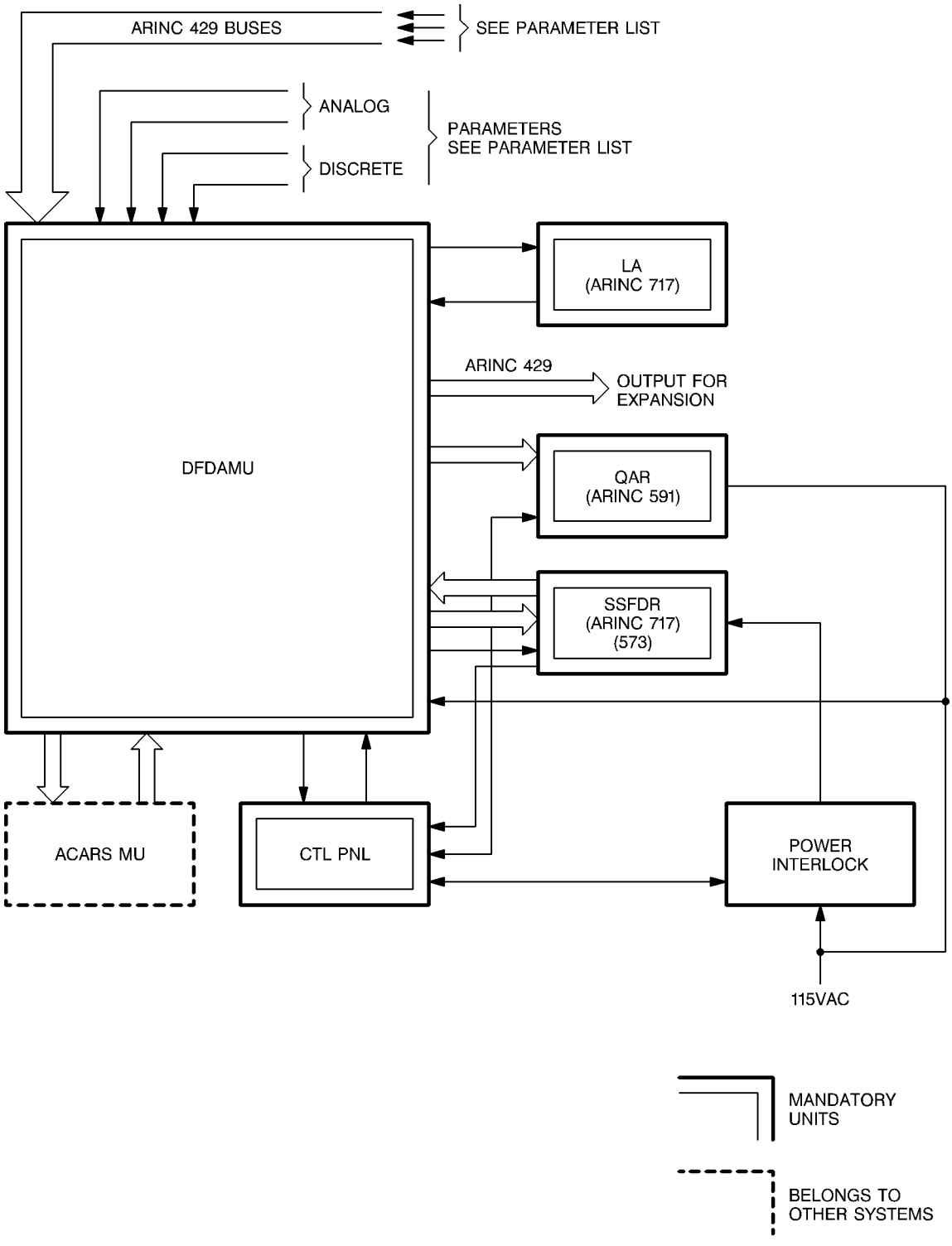
R (Ref. Fig. 003)



BM6 31 30 00 0 BBA0 00

AIDS Block Diagram
Figure 002

R



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AIDS Block Diagram
Figure 003

R

1. General
The purpose of the **AIDS** is the onboard recording of various critical flight parameters. The stored data is also applicable to monitor the condition of the connected **A/C** systems.
The parameters for recording are collected and converted by the **DFDAU**. The processed data is located in time slots on the serial bus to the **DFDR**.

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

1. General
The purpose of the **AIDS** is the onboard recording of various critical flight parameters. The stored data is also applicable to monitor the condition of the connected **A/C** systems.
The parameters for recording are collected and converted by the **DFDAMU**. The processed data is located in time slots on the serial bus to the **SSFDR**.

**ON A/C 101-200,

2. Component Location
(Ref. Fig. 001)

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

(Ref. Fig. 002)

**ON A/C 101-200,

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
1TU	DIGITAL FLIGHT DATA RECORDER		171		31-31-35
4TU	MOUNT, DFDR		171		
2TU	DIGITAL FLIGHT DATA ACQUISITION UNIT	94VU	122		31-31-15
5TU	MOUNT, DFDAU	94VU	122		
6TU	LINEAR ACCELEROMETER		145		31-31-16

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
	CONTROL PANEL	442VU	210		
50TU	MONITORING INDICATOR DFDR/DFDAU ON CTL PNL	442VU	210		
51TU	CONTROL AND MONITORING INDICATOR GND CTL/ON ON CTL PNL	442VU	210		
52TU	SWITCH, EVENT	418VU	210		
64TU	RELAY	442VU	210		
65TU	RELAY	442VU	210		

R **ON A/C 101-104,

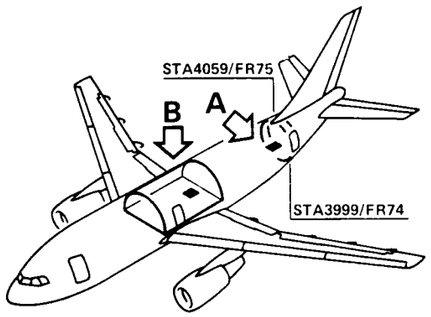
R Post SB 31-2116 For A/C 101-104,

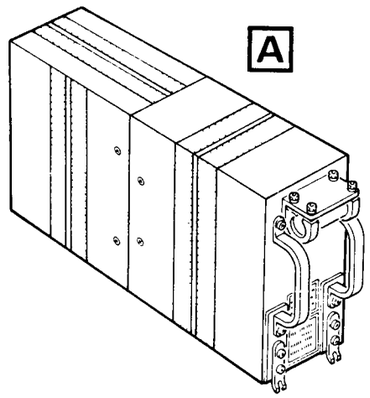
R Post SB 31-2117 For A/C 101-104,

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
1TU	SOLID STATE FLIGHT DATA RECORDER		171		31-31-35
4TU	MOUNT, SSFDR		171		
2TU	DIGITAL FLIGHT DATA ACQUISITION AND MANAGEMENT UNIT	94VU	122		31-31-15
5TU	MOUNT, DFDAU	94VU	122		
6TU	LINEAR ACCELEROMETER		145		31-31-16
	CONTROL PANEL	442VU	210		
50TU	MONITORING INDICATOR DFDR/DFDAU ON CTL PNL	442VU	210		
51TU	CONTROL AND MONITORING INDICATOR GND CTL/ON ON CTL PNL	442VU	210		
52TU	SWITCH, EVENT	418VU	210		
64TU	RELAY	442VU	210		
65TU	RELAY	442VU	210		

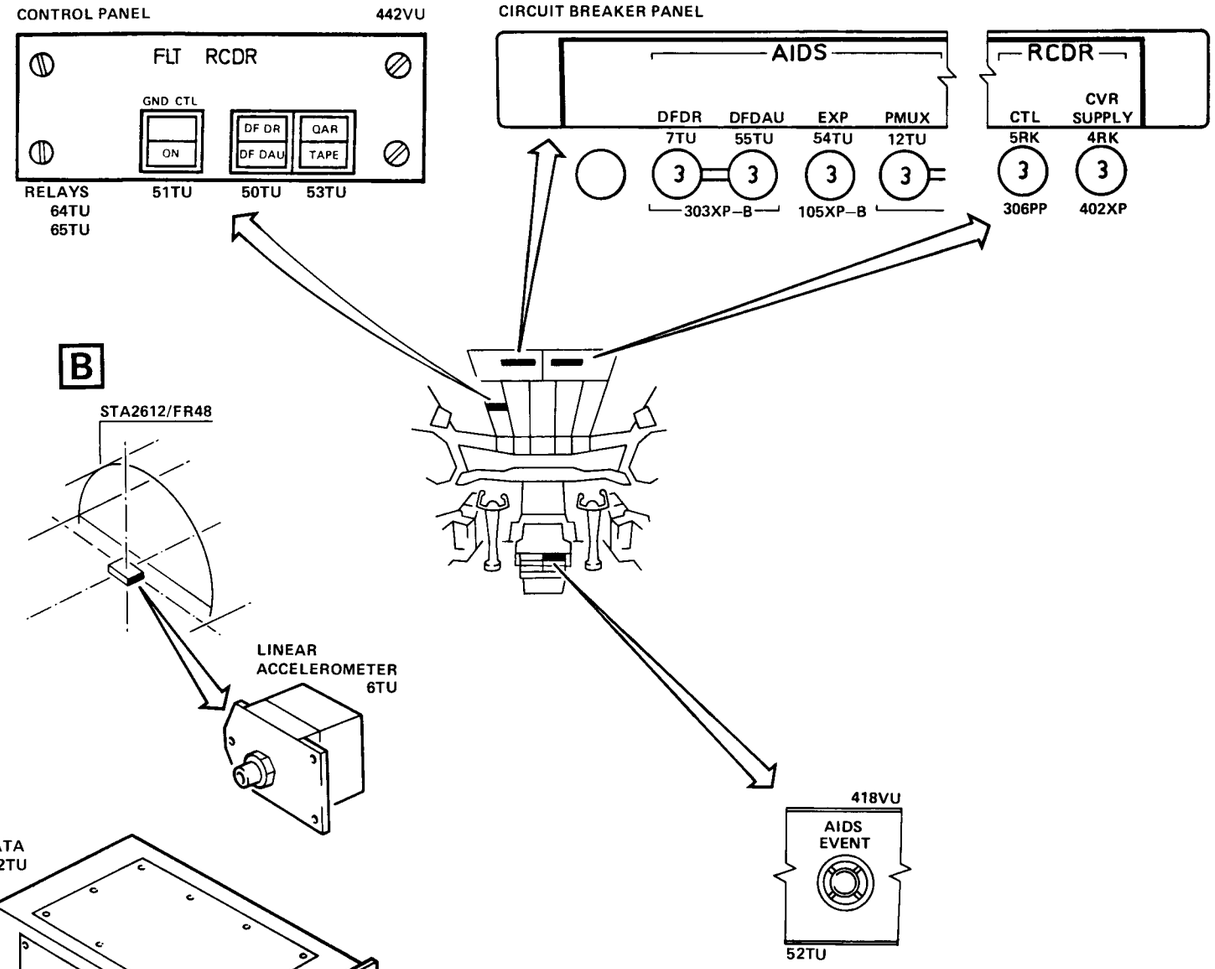
**ON A/C 101-200,

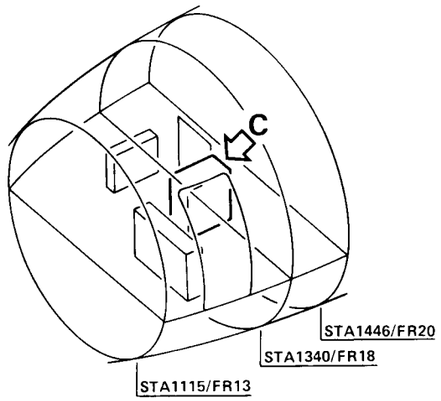
NOTE : For component locations of equipment which is not part of this system refer to respective chapters, e.g. RK-COM./COCKPIT VOICE RECORDER.

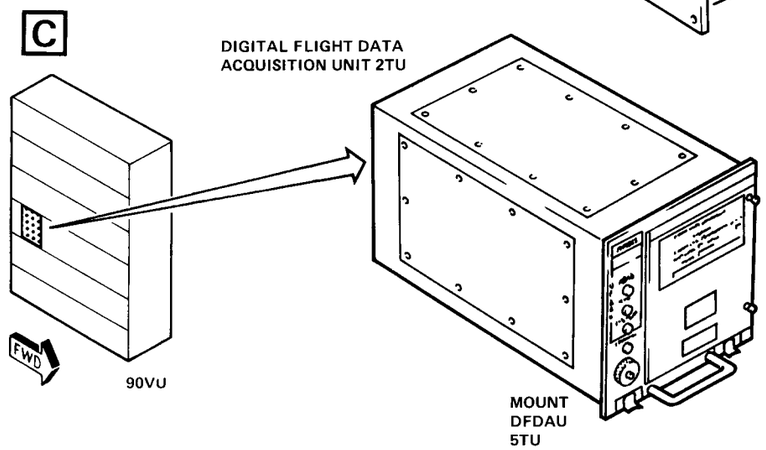




DIGITAL FLIGHT DATA
RECORDER 1TU
MOUNT DFDR 4TU







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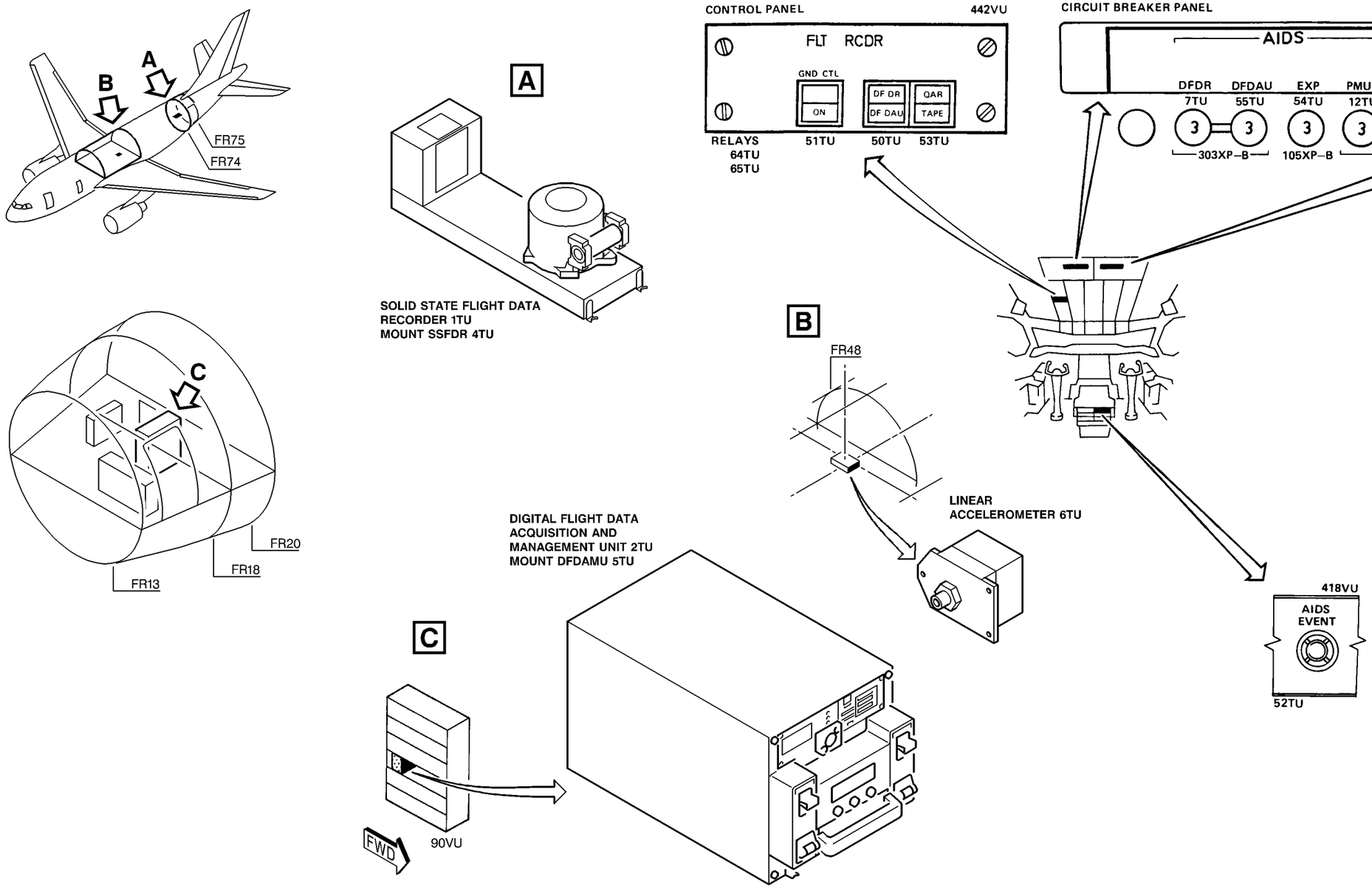
AIDS Component Location
Figure 001

R

EFFECTIVITY: 101-200,

PIA



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AIDS Component Location
Figure 002

R EFFECTIVITY: 101-104,

PIA

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3. System Description

A. System Architecture
The AIDS consists of a basic installation of:
- a digital flight data acquisition unit (DFDAU)
- a digital flight data recorder (DFDR)
- a control panel (CTL PNL)
- a linear accelerometer (LA)

The basic equipment has to be installed to fulfil the requirements of the authorities for recording of mandatory parameters.
With the expansion equipment the processing of flight data is performed to generate hard-copy prints and to store diagnostic data on the respective recorder.
A supplemental control unit (SCU) is installed on each engine to collect the engine data which are required to execute the engine condition monitoring (ECM).

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

3. System Description

A. System Architecture
The AIDS consists of a basic installation of:
- a digital flight data acquisition and management unit (DFDAMU)
- a solid state flight data recorder (SSFDR)
- a control panel (CTL PNL)
- a linear accelerometer (LA)

The basic equipment has to be installed to fulfil the requirements of the authorities for recording of mandatory parameters.
With the expansion equipment the processing of flight data is performed to generate hard-copy prints and to store diagnostic data on the respective recorder.
A supplemental control unit (SCU) is installed on each engine to collect the engine data which are required to execute the engine condition monitoring (ECM).

**ON A/C 101-200,

(Ref. Fig. 003)

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

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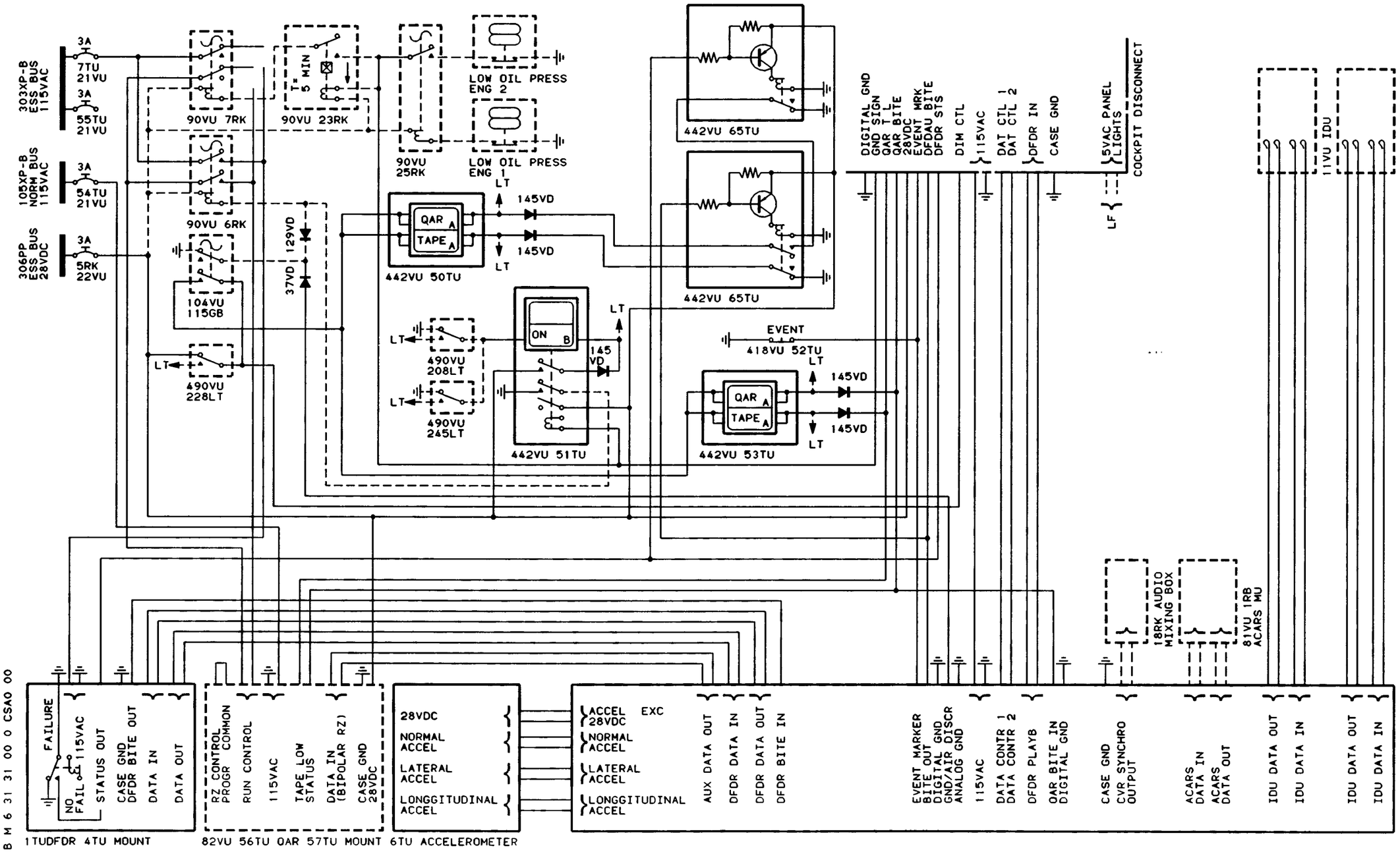

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AIDS Interconnection Schematic
Figure 003

R

R Post SB 31-2117 For A/C 101-104,

(Ref. Fig. 004)

**ON A/C 101-200,

B. System Power Supply
The units are supplied by the A/C generated power supply where characteristics as noted in ARINC 413A are permissable.
The power supply of the DFDR is controlled by the power interlock.
The LA is directly supplied from the DFDAU.
The supply of the power interlock relays is achieved via circuit breaker 5RK. For power interlock description refer to subsection energization.
The busbar connection is as listed below.

ITEM	VOLTAGE	BUSBAR	CIRCUIT BREAKER
DFDR	115 V AC	303XP ESS	7TU
DFDAU	115 V AC	303XP ESS	55TU
LA	28 V DC	Power supply included in DFDAU	

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

B. System Power Supply
The units are supplied by the A/C generated power supply where characteristics as noted in ARINC 413A are permissable.
The power supply of the SFFDR is controlled by the power interlock.
The LA is directly supplied from the DFDAMU.
The supply of the power interlock relays is achieved via circuit breaker 5RK. For power interlock description refer to subsection energization.
The busbar connection is as listed below.

ITEM	VOLTAGE	BUSBAR	CIRCUIT BREAKER
SSFDR	115 V AC	303XP ESS	7TU
DFDAMU	115 V AC	303XP ESS	55TU
LA	28 V DC	Power supply included in DFDAMU	

**ON A/C 101-200,

(Ref. Fig. 005)

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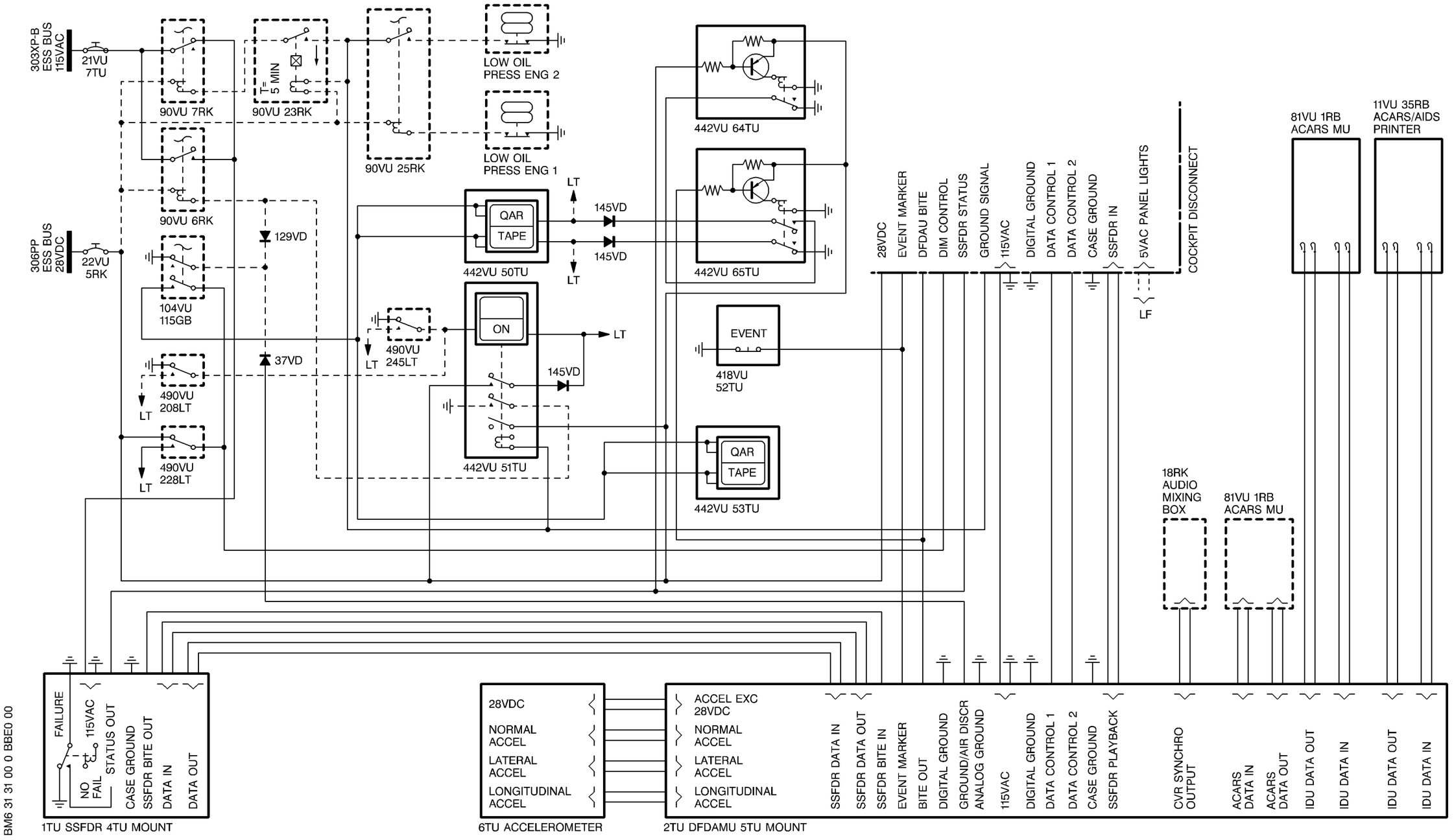


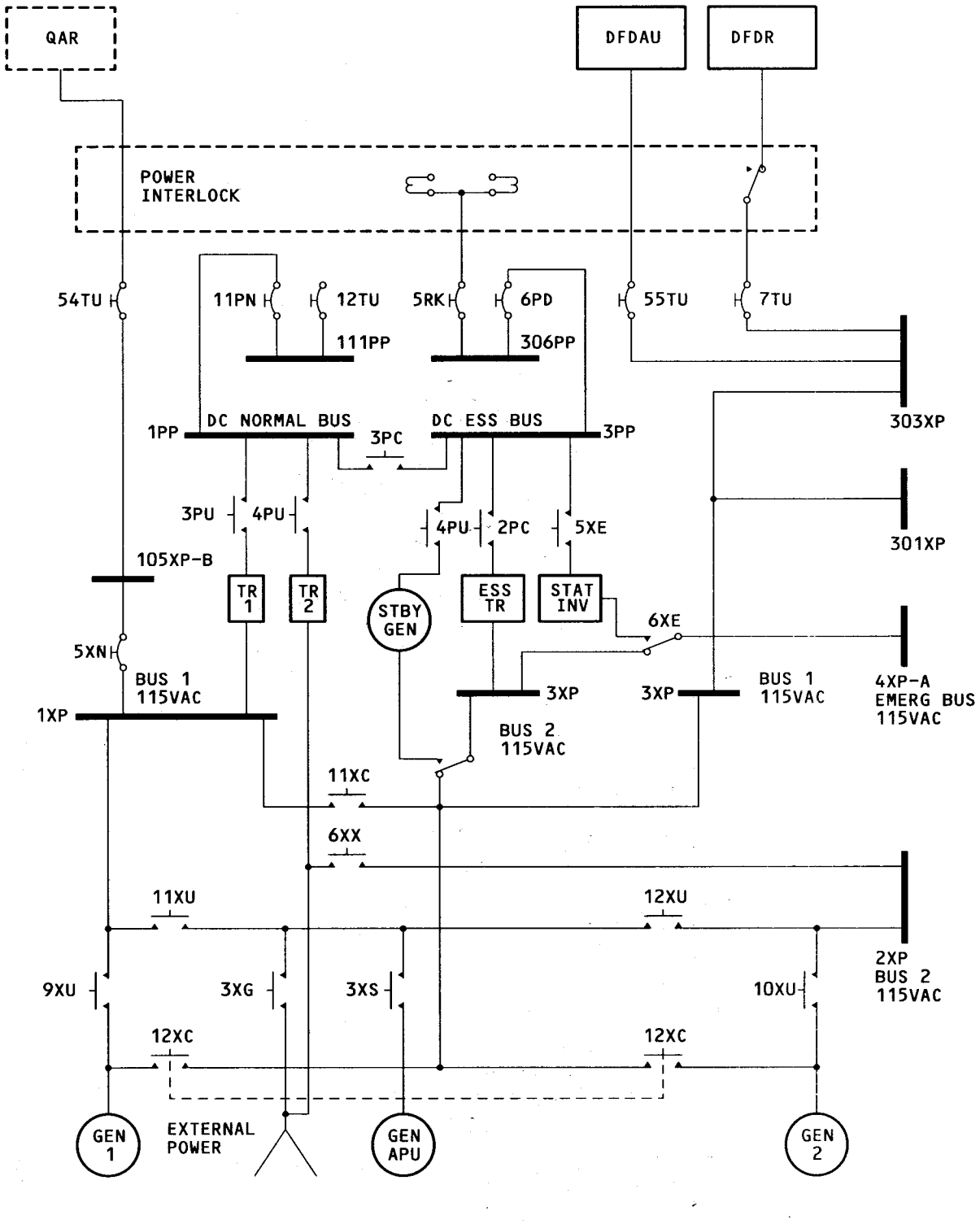
BM6 31 31 00 0 BBE0 00

AIDS Interconnection Schematic
Figure 004

R EFFECTIVITY: 101-104,

PIA

Printed in France



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AIDS Power Supply
Figure 005

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

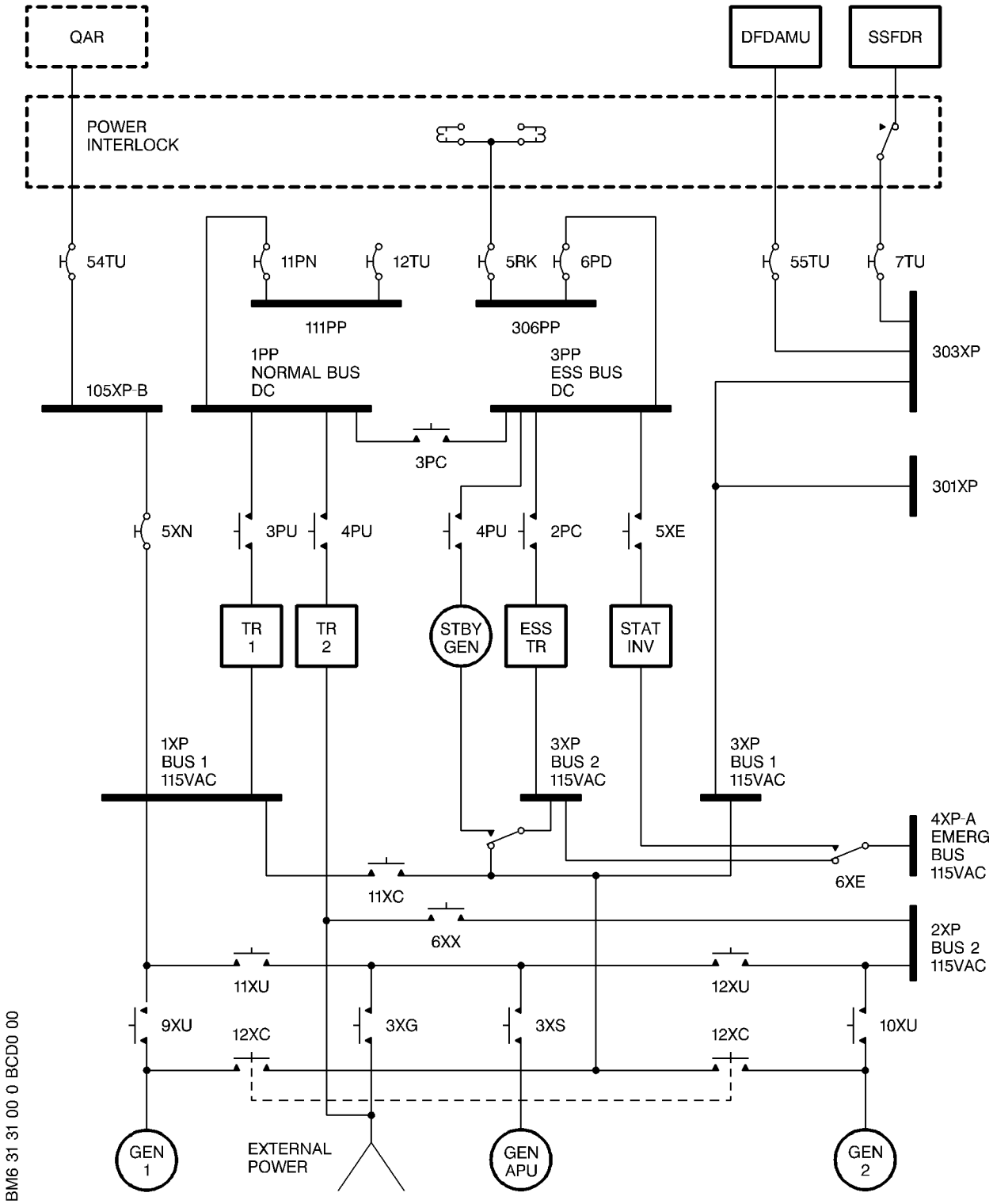
(Ref. Fig. 006)

**ON A/C 101-200,

C. Component Description
(1)Digital Flight Data Acquisition Unit (DFDAU)
The DFDAU is a microprocessor controlled unit which contains all the modules necessary for acquisition, conversion and the recording of mandatory parameters. Communication is made via a serial interface to exchange data already collected or processed.
The functions and the interface comply with ARINC 717.
All software relative to the acquisition, processing and output of mandatory and standardized parameters is stored in dedicated memory under the control of CPU No. 1 of the DFDAU.
(a)Input Characteristics
1 Parameter inputs
80 analog inputs for:
- SYNCHRO
- DC VOLTAGE
- DC RATIO
- RESISTANCE PROBE with the appropiate reference inputs and outputs.
126 discrete inputs for:
- SHUNTS
- SERIES
- AC SENSITIVES
- MARKER BEACON
- IDENT
48 DITS - ARINC 429 input ports, programmable for:
- LOW SPEED (12 to 14 Kbit/s)
- HIGH SPEED (100 Kbit/s)

2 System internal inputs
DFDR PLAYBACK DATA input:
- playback of DFDR data for verification
DFDR BITE IN:
- status line from DFDR
GND/AIR DISCRETE:
- ground/air status of the A/c

(b)Output Characteristics:
DFDR
- 64 bit words per second, 12 bit each
- HARVARD BIPHASE CODE



AIDS Power Supply
Figure 006

R EFFECTIVITY: 101-104,

PIA

Printed in France

DFDR PLAYBACK DATA output
- transmission of playback data, received from DFDR

STATUS
- signal line to indicate the status of the DFDAU on the control panel.

(c) DFDAU Internal Characteristics

The DFDAU CPU No. 1 performs a self testing check. A fault condition will generate a DFDR failure code and the 'DFDR Fail' indicator will illuminate on the front panel of the DFDAU.

(d) Functions of the DFDAU

The software controlled functions of the DFDAU are as follows:
- analog and discrete parameter selection
- calibration control
- selection of parameters from ARINC 429 buses
- formatting of DFDR data output
- processing of DFDR playback
- execution of Built-In-Test (BITE)

Acquisition circuitry is provided for analog, discrete and ARINC 429 parameters. The acquisition circuits provide filtering, amplification, isolation and conversion of the input signals.

The received analog signals are conditioned and converted to digital values depending on the input type. The values are stored and updated in memory for further processing. The circuitry for acquisition of the analog signals is concentrated in the Analog Multiplexer module (AMX). The conditioned analog signals are converted to digital values in the Analog to Digital Converter module (ADC).

The discrete ON/OFF signals are sampled according to the connection as series or shunt discretes. The status of these signals is stored and updated in memory. The circuitry for acquisition and conversion of the ARINC 429 bus data is located on two DITS interface modules. The circuitry for the control of the status indicator on the CRT PNL and for data transmission to the DFDR is concentrated in the DFDR Interface module. This module also includes circuitry to receive playback data from the DFDR.

1 Analog and Discrete Parameter Selection

All analog and discrete inputs are sequentially sampled, signal conditioned and converted to digital values. The converted digital signals are accomodated in the least significant bit of the output data, depending on constraints in the output format. The data is stored in a data output field for DFDR output processing.

2 Selection of Parameters from ARINC 429 buses

The defined parameters are selected from the data stream received from each ARINC 429 data bus. All variable digital input data is examined for status (except BCD data), correct parity and update. Any parameter which fails these tests is set to a defined pattern and is not used for any logic decisions. An average of the checked data is stored in the data output field for DFDR output processing.

3 Execution of Built-In-Tests (BITE) of CPU No. 1

The software is designed to detect abnormal conditions of the active circuitry (95%).

The CPU No. 1 related tests include:

- test of power supply voltage levels
- test of the DFDR output, and
- test of the periodic sum check of EPROM memory.

Any detected failure creates the respective error code in the system status buffer. This buffer is capable of storing up to a maximum of 16 failure codes in non-volatile memory.
The ARINC input status results are recorded in the status word of the the DFDR output data (word 51, subframe 3).
The contents of the status buffer are accessible for readout on the three digit front panel indicator. Any abnormal condition is annunciated on the front panel indicator as 'DFDAU Fail' and activates the status output signal.
Pressing the 'READ' switch sequentially indicates all failure codes, each for 4 seconds.
These are:

- DFDR Wraparound Failures
- DFDAU Power Supply Failures
- Analog Channel Failures
- DITS Wraparound Failures
- CPU Failures

For execution of the lamp test the 'DFDAU Fail', 'DFDAU Caution', 'DFDR Fail' lights will illuminate and the three-digit display will indicate '888' (for 4 seconds) at any time the 'READ' switch is pressed.

(e)Verification of DFDR Playback Data
To verify recorded data, the DFDAU receives the playback data via a serial data bus. This data is generated from a separate playback circuit. Part of the received playback data is taken at random and compared with the DFDAU output data. In case of any discrepancy, the respective error code is generated in the system status word.

(f)Identification of Location
The DFDAU is capable of recognizing its location on different aircraft by decoding the aircraft and airline identification discretes. Parameter selection and data processing depends on this identification code. For aircraft type and fleet identification 18 IDENT DISCRETES are provided.

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

C. Component Description

(1)Digital Flight Data Acquisition and Management Unit (DFDAMU)
The DFDAMU is divided into two totally separated microprocessor controlled functional parts, the DFDAU part and the DMU part.

(a)DFDAU

The DFDAU part performs the acquisition of various mandatory flight parameters that many appear in the form:
- analog acquisition to standard ARINC 717,
- discrete acquisition to standard ARINC 717,
- digital buses to standard ARINC 429.

It processes these data so that they can be used by:
- the Solid State Flight Data Recorder (SSFDR),
- the Cockpit Voice Recorder (CVR),
- the DMU part of the DFDAMU.

(b)DMU

The DMU part of the DFDAMU performs processing, monitoring and recording of various parameters necessary to the maintenance and follow up of the aircraft and its engineers.

These parameters can be originated from:
- the link from the DFDAU to standard ARINC 429, for discrete and analog parameters,
- A/C buses to standard ARINC 429.

These various data are output to peripherals through the following links:
- MCDUSs (ARINC 739)
- ACARS (ARINC724/724B)
- MPTR (ARINC 740/744/744A)
- ADL/PDL (ARINC 615)
- DAR (ARINC 591)

They also can be recorded in the PCMCIA based Integrated Customized ACMS Recorder.

(c)Front panel description

The Front panel includes the following:
- A front Panel Display (FPD) with 2 lines of 16 characters each to show the software part numbers and maintenace status.
- 3 buttons to scroll the FPD menus: WELECT, SCROLL, ESCape
- an access door to the test plug for maintenance purpose,
- an access door to ICAR internal recorder media (PCMCIA PC CARD)
- three status light indicators: "FDAU FAIL", "DFDR FAIL", "DMU FAIL".
- a switch to activate the internal RAM battery backed-up: "ON" and "OFF" positions.
- a carrying handle,
- two brackets for locking the unit on the rack,
- an identification label.

(d)Interface Characteristics

1 DFDAU part

Parameter inputs:

48 analog inputs for
- SYNCHRO
- DC VOLTAGE
- DC RATIO
- RESISTANCE PROBE

with the appropriate reference inputs and outputs

99 discrete inputs for
- 34 SHUNT
- 40 SERIES

- 8 AC SENSITIVES
- 3 MARKER BEACON
- 14 IDENT

46 ARING 429 buses, speed programmed according to A/C Config.:
Among these 31 buses:
- high speed (100 Kbit/sec)
- low speed (12,5 Kbit/sec)

In addition, it rereives the vollowing discret data:
- SSFDR BITE,

System inputs:
SSFDR PLAYBACK DATA input
- playback of DFDR data for verification

SSFDR BITE IN
- status line from SSFDR

GND/AIR DISCRETE
- ground/air status of the A/C

Outputs:
DFDAU BITE.
- signal line to indicate the status of the DFDAMU on the CTL PNL

DFDR
- 64, 128 or 256 bit words per second, 12 bit each
  HARVARD BIPHASE CODE

SSFDR PLAYBACK DATA output
- transmission of playback data, received from SSFDR.

2 DMU part
56 ARING 429 buses, all speed programmable.
ADL,PDL,PI - Interface
- a bi-directional high speed ARING 429 link.
- ADL ENABLE input, discrete Input

MCDU 1/MCDU 2 and MPTR interface:
an input low speed ARINC 429 link connected to MCDU1,
an input low speed ARINC 429 link connected to MCDU2,
an input low speed ARINC 429 link connected to MPTR,
an output low speed ARINC 429 link connected to MCDU1, MCDU2 and MPTR

ACARS Interface:
A bi-directional low speed ARINC 429 link.
Discrete outputs:
- DMU bite out,
- DMU disrete out (spare).

A high speed ARINC 429 bus to broadcast DFDAMU data.
A PCMCIA ATA Type III or II interface.

(e)Functions of the DFDAMU Mandatory Section - DFDAU part
The software controlled functions of the DFDAU mandatory section are as follows:
- analog and discrete parameter selection
- calibration control
- selection of parameters from ARINC 429 buses
- formatting of SSFDR data output
- processing of SSFDR playback
- identification of location

- processing of data downlink to the DMU part
- execution of built-in-test (BITE)

Analog and Discrete Parameter Selection

All analog and discrete inputs are sequentially sampled, signal conditioned and converted to digital values. The converted analog signals are stored in a data output field for SSFDR output processing.

Selection of Parameters from ARINC 429 buses

The defined parameters are selected from the data stream received from each ARINC 429 data bus. Digital input data is examined for correct parity. The checked data is stored in the data output field for SSFDR output processing.

Formatting of SSFDR Data Output

Data to the SSFDR is transmitted continuously in Harvard Biphase Code at a rate of 1536 bits per second. The output data is organized in frames of 4 seconds. Each frame consists of 4 subframes with 128 words each. One word of output data contains 12 bits. The parameters are assigned to specific word slots of the subframes.

Converted analog signals or digital values occupy 10 or alternatively 12 bits of an output word. The discrete information is assigned to the remaining 2 bits of the 10 bits values.

The output data contains a running frame counter to allow detection of short time data loss at ground processing. This frame counter is incremented by one every frame.

In order to accommodate the recording of documentation data a superframe is created in the data output format. The superframe data is recorded in word 118 subframe 1 to 4 with different assignment over 16 frame cycles.

Verification of SSFDR Playback Data

To verify the recorded data, the DFDAU part receives the playback data via a serial data bus. This data is generated from a separate playback circuit. Some of the received playback data is compared with the DFDAU output data. In case of discrepancies the respective error code is stored in the status buffer.

Identification of Location

The DFDAMU is capable of recognizing its location on different aircraft and airline identification discretes. Parameter selection and data processing depens on this identification code. For aircraft type and fleet identification 18 IDENT DISCRETES are provided.

Data Downlink to the DMU part

All analog and discrete parameters collected in the DFDAU part are transmitted to the DMU part via an initiated ARINC 429 high speed bus. In addition a set of documentary and status parameters is transmitted via this bus. This set of documentary and status parameters includes:

- BITE SSFDR
- BITE DFDAU
- FLEET IDENTIFIER
- A/C TYPE IDENTIFIER
- A/C TAIL NUMBER
- DATE
- FLIGHT NUMBER

Execution of Built-In-Tests (BITE)

The software is designed to detect abnormal conditions of the active circuitry.
The DFDAU part related tests include
- test of the microprocessor
- test of the PROM and RAM
- test of the analog channels (using test channels)
- test of the discrete inputs
- test of the ARINC 429 inputs
- test of the SSFDR output
- test of the SSFDR playback
- test of power supply voltage levels

Any detected failure creates the respective error codes in the status word. The stored test results are recorded in the status word of the SSFDR output data (word 117, subframe 3) and are transmitted to the DMU part via the internal data downlink. Abnormal conditions are annunciated on the front panel indicators 'FDAU FAIL' and 'DFDR FAIL'. They also activate the status output signal.

(d) Functions of the DFDAMU Data Management Section - DMU part

The software controlled functions of the DFDAMU data management section are:
- parameter selection from ARINC 429 buses
- processing of data downlink from the DFDAU part
- flight mode determination
- limit exceedance tests
- history memory management
- mass memory management
- control of serial output to a printer
- control of serial input/output for a CDU
- execution of built-in-test (BITE)
- ACARS communication
- ADL/PDL up-/downloading

The DMU part has access to the analog, discrete and digital data collected by the DFDAU part. The data management functions include the data processing and the output of formatted data or results to the Printer. Also communication with CDU is performed by the DMU part.
Parameter selection from ARINC 429 buses.
The defined parameters are selected from the data stream received from each ARINC 429 data bus. Digital input data is examined for correct parity. The DMU part receives all analog, discrete, status and documentary parameters from the DFDAU part via the internal ARINC 429 high speed bus. Direct access to the general ARINC 429 acquisition memory is provided for the DMU part. Priority to this memory is always allocated to the DFDAU part.
Flight Mode Determination
The initiation of processing routines are based on and controlled by the mode determination. The flight leg is divided in flight modes determined by a set of parameter values. The flight modes are defined as:
Mode 1 - ..... PREFLIGHT CHECK
Mode 2 - ..... ENGINE START
Mode 3 - ..... TAXI

Mode 4 - ..... TAKE OFF ROLL
Mode 5 - ..... CLIMB
Mode 6 - ..... CRUISE
Mode 7 - ..... DESCENT
Mode 8 - ..... APPROACH/LAND
Mode 9 - ..... ROLL-OUT

Mass Memory Management

The mass memory is used in flight to store ECM reports and alarms (BITE). The respective report is stored

- when an event occurs,
- on request by pressing the EVENT pushbutton
- or in case of detection of special ECM conditions.

A catalog of the stored reports can be displayed on the CDU with title, report code, data and flight number of the reports. For printout initiation a special report or all reports can be selected via the CDU.

Control of Serial Input/Output Data for CDU (Optinal)

A CDU interface is provided to respond to CDU requests for parameter data display, print report initialization and system status display. This interface consists of an ARINC 429 data input/output pair. The received CDU data initiate the respective software routines for data processing and output to CDU or printer.

ACARS communication

The DMU provides the capability of automatic data transfer between the aircraft and ground based computer systems, through the ACARS MU, using 2 types of messages:

- downlink message (from air to ground)
- uplink message (from ground to air)

The communication protocol between the ACMS and ACARS and the rules of ACARS uplink requests are defined in ARINC 724B.

ADL/PDL up-/downloading

The ADL/PDL is used for two types of operations:

- Loading software: 'Operational software' that contains processing software which is under SFIM control and the 'Customer database' which contains customer application data. This database can be modified, under customer control.
- Downloading of data: Retrieval of reports stored in the DMU memory.

For data transfer between ADL and DMU the aircraft has to be on ground and the ADL switch must be in the ACMS position. For data transfer between PDL and DMU the aircraft has to be on ground and the correct PDL cable has to be connected to the DMU.

Execution of Built-In-Test of the DMU part

The DMU part related tests include

- test of the microprocessors,
- test of RAM, EPROM and EEPROM memories,
- monitoring of internal clock using a 'watch dog' timer,
- monitoring of internal ARINC 429 bus from DFDAU part,
- monitoring of ARINC 429 bus data acquisition,
- test of the interrupts,
- test of the ACARS lines,
- test of the printer status lines,
- monitoring of the power supply.

Any failure of the internal checks is indicated by the 'FDAU FAIL' light located on the front panel of the DFDAMU. The respective error codes are accessible via the CDU. They also activate the 'AIDS FAIL' light on the CDU.
Two buffers in EEPROM memory are used for the storage of the DMU fault and the DFDAU fault (30 each). These two buffers are accessible via the CDU for the fault display with 'DISPLAY EEPROM'.

**ON A/C 101-200,

(Ref. Fig. 007)

R **ON A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

(Ref. Fig. 008)

**ON A/C 101-200,

(Ref. Fig. 009)

R **ON A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

(Ref. Fig. 010)

**ON A/C 101-200,

(Ref. Fig. 011)

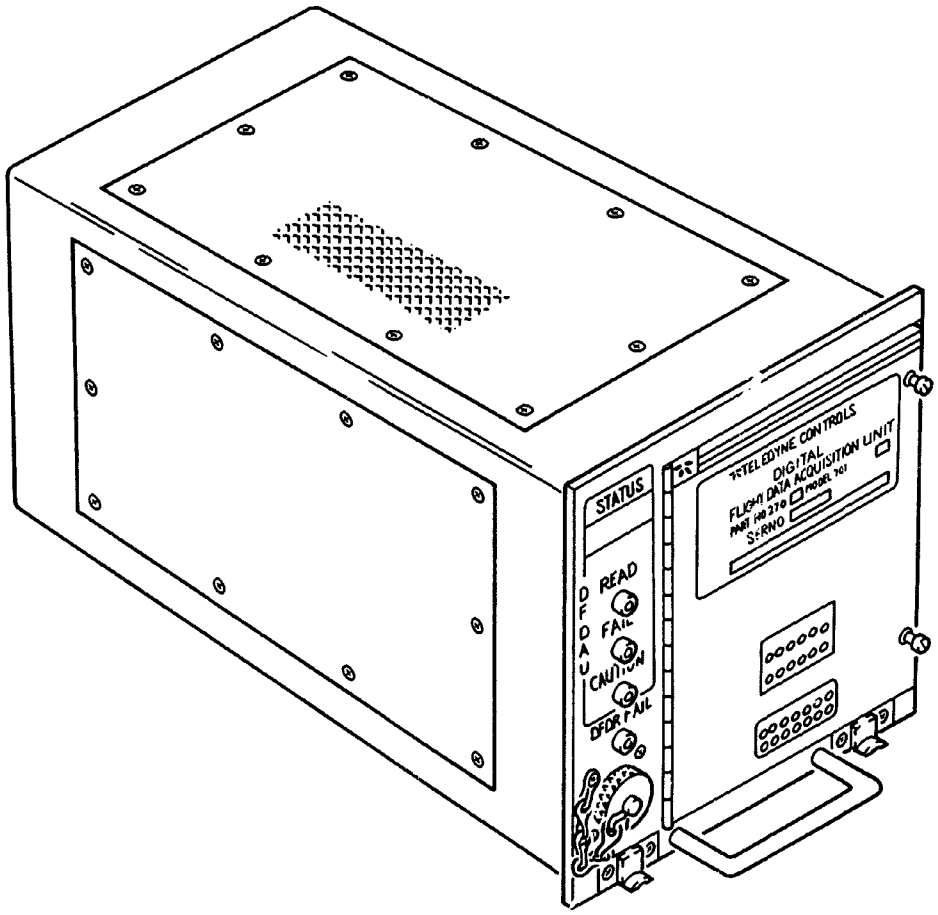
R **ON A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

(Ref. Fig. 012)

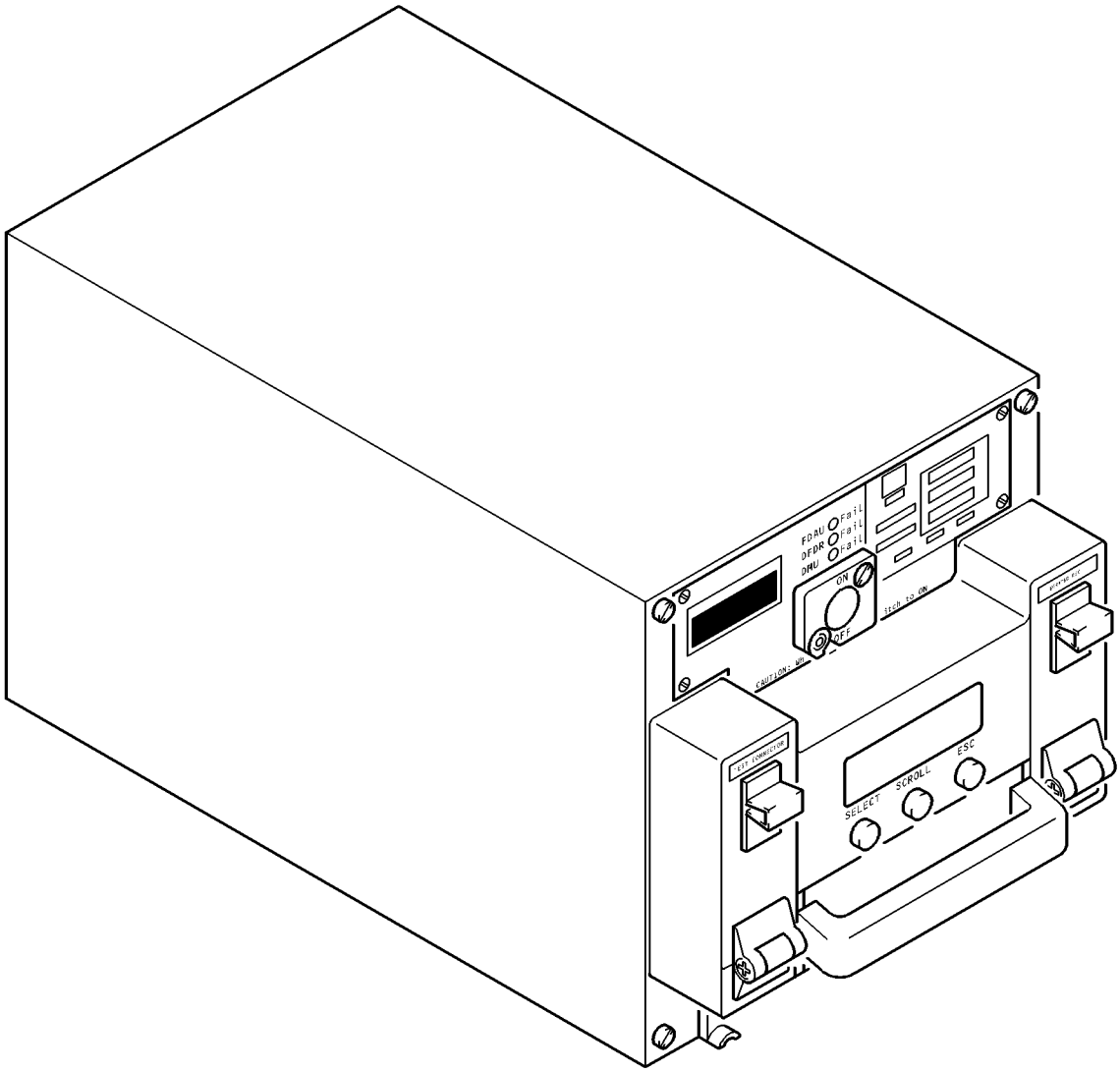
**ON A/C 101-200,

(2)Digital Flight Data Recorder (DFDR)
The DFDR is in compliance with ARINC 717.
This recorder has the capability to store the last 25 hours of data collected by the DFDAU.
The DFDR functional block diagram illustrates the internal interconnection of the modules of the DFDR.
(a)Interface
The data input is connected to the DFDAU.



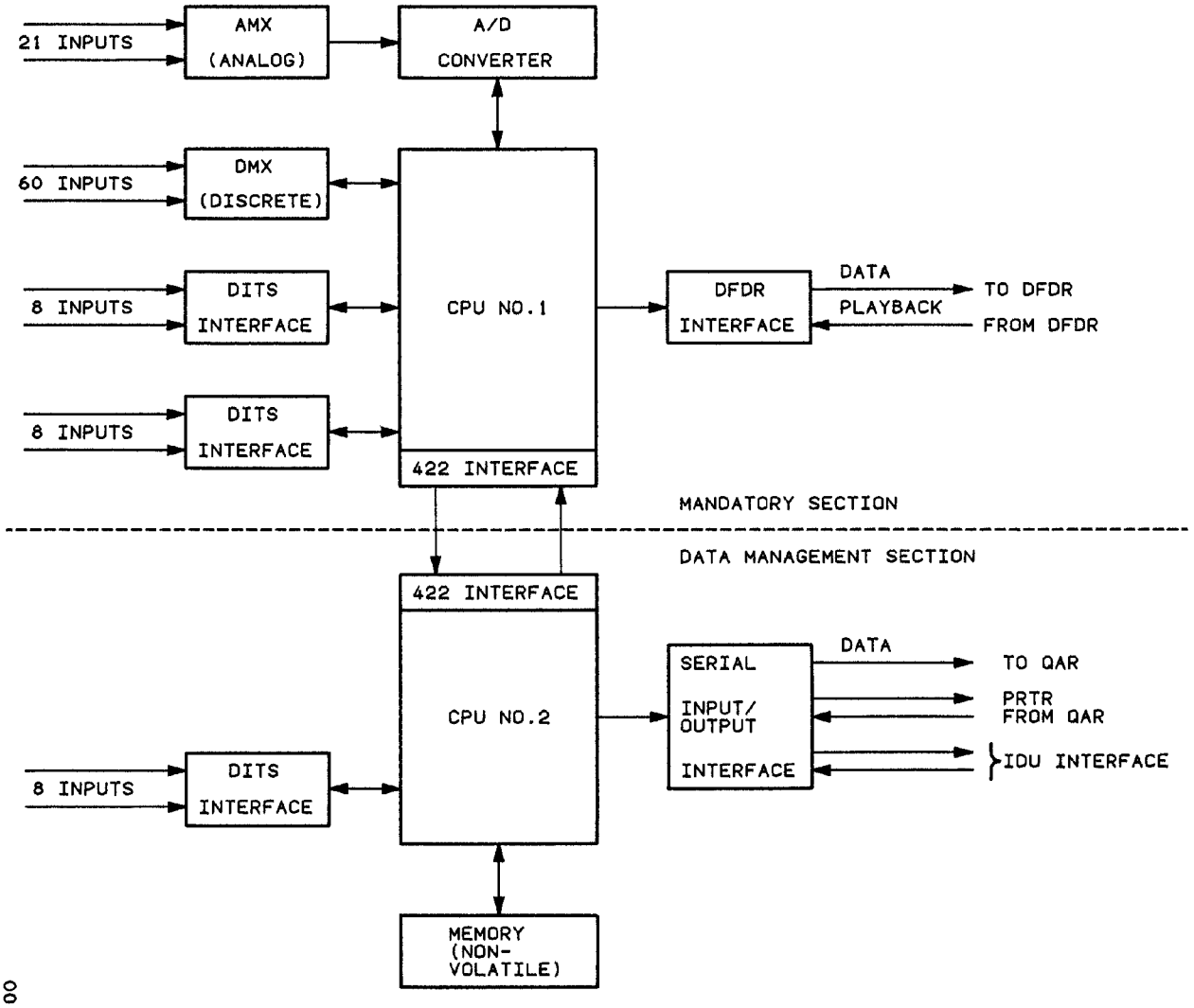
B M 6 31 31 00 0 A G S 0 - 11

AIDS DFDAU
Figure 007



BM6 31 31 00 0 BGA0 00

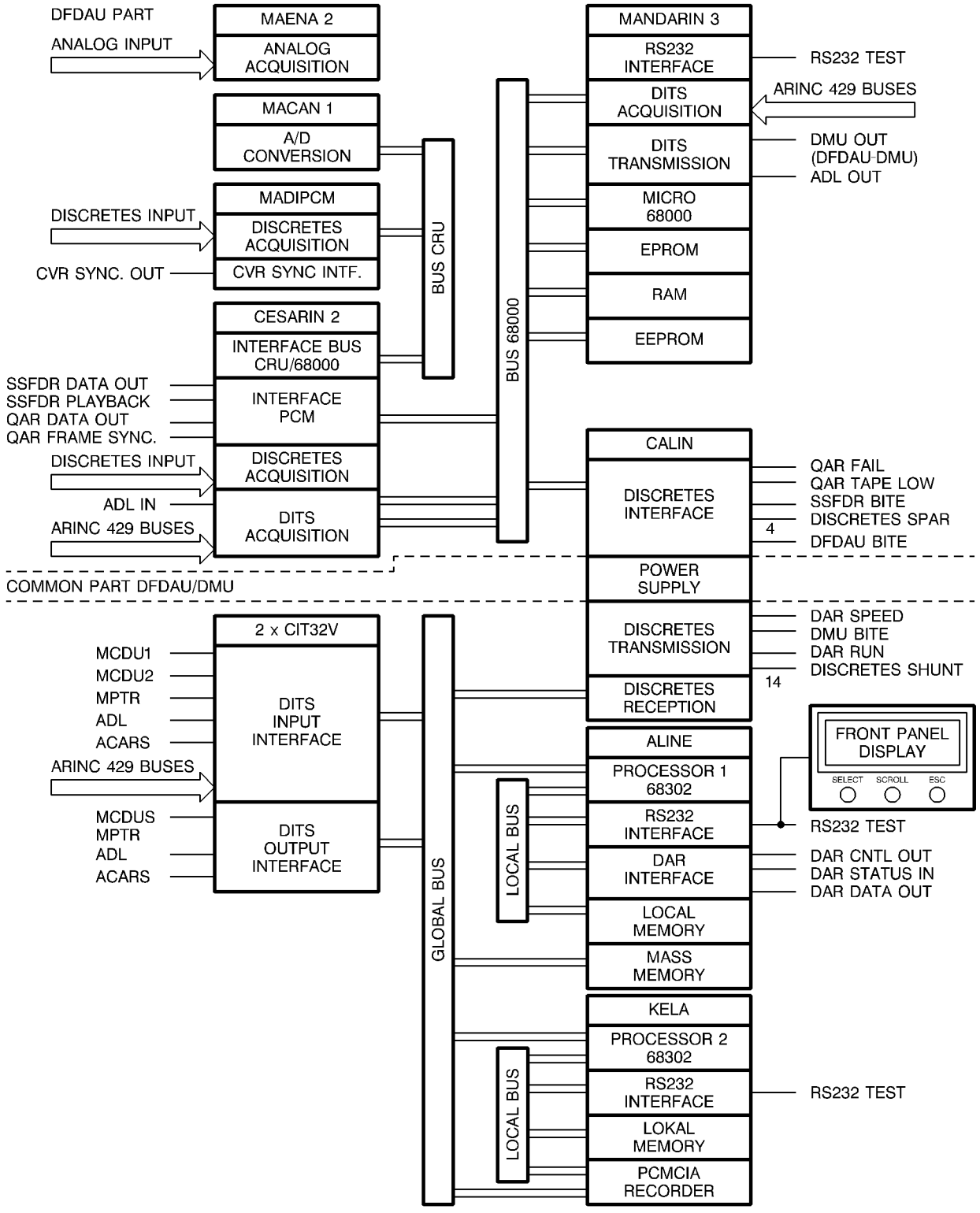
AIDS DFDAMU
Figure 008



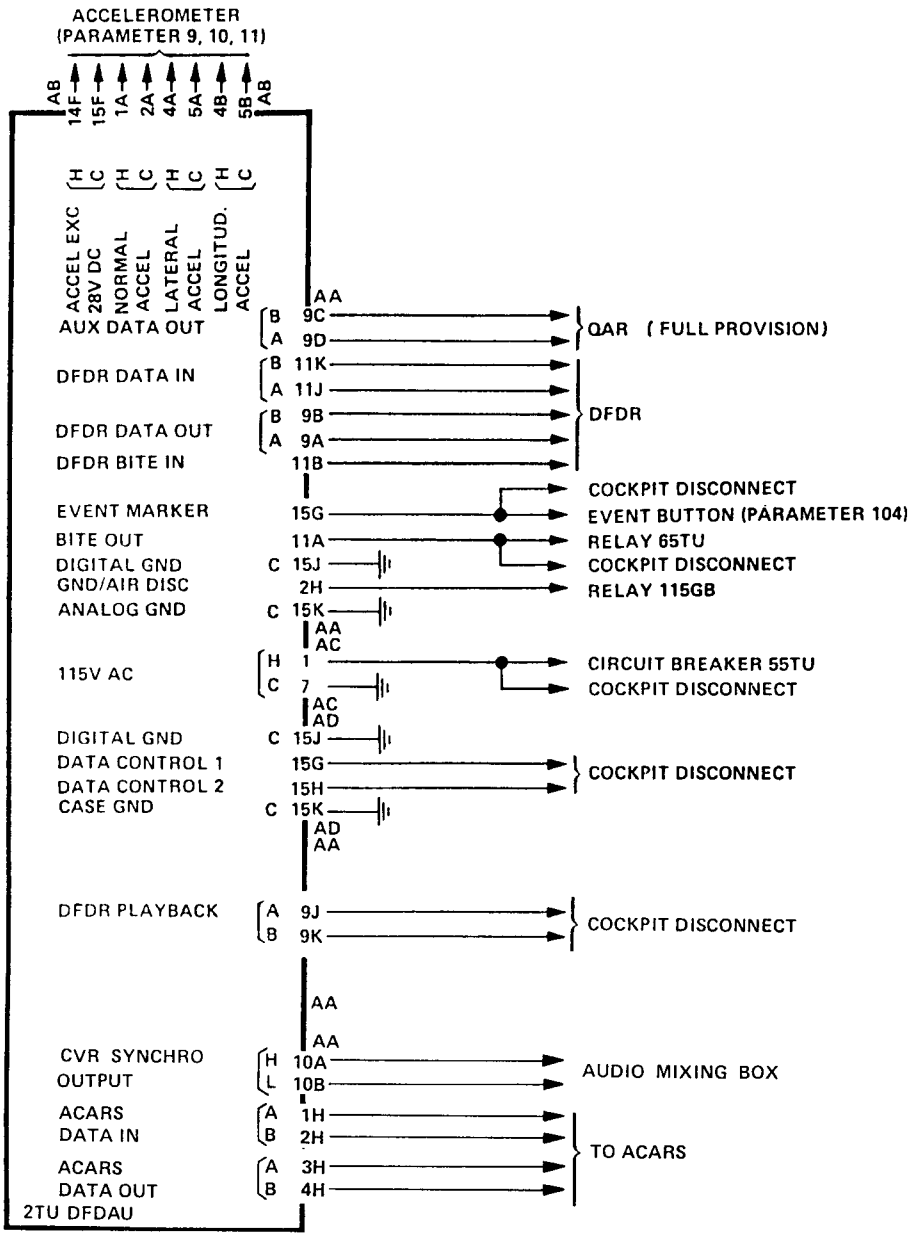
B M 6 31 31 00 0 AJY0 00

DFDAU Block Diagram
Figure 009

R



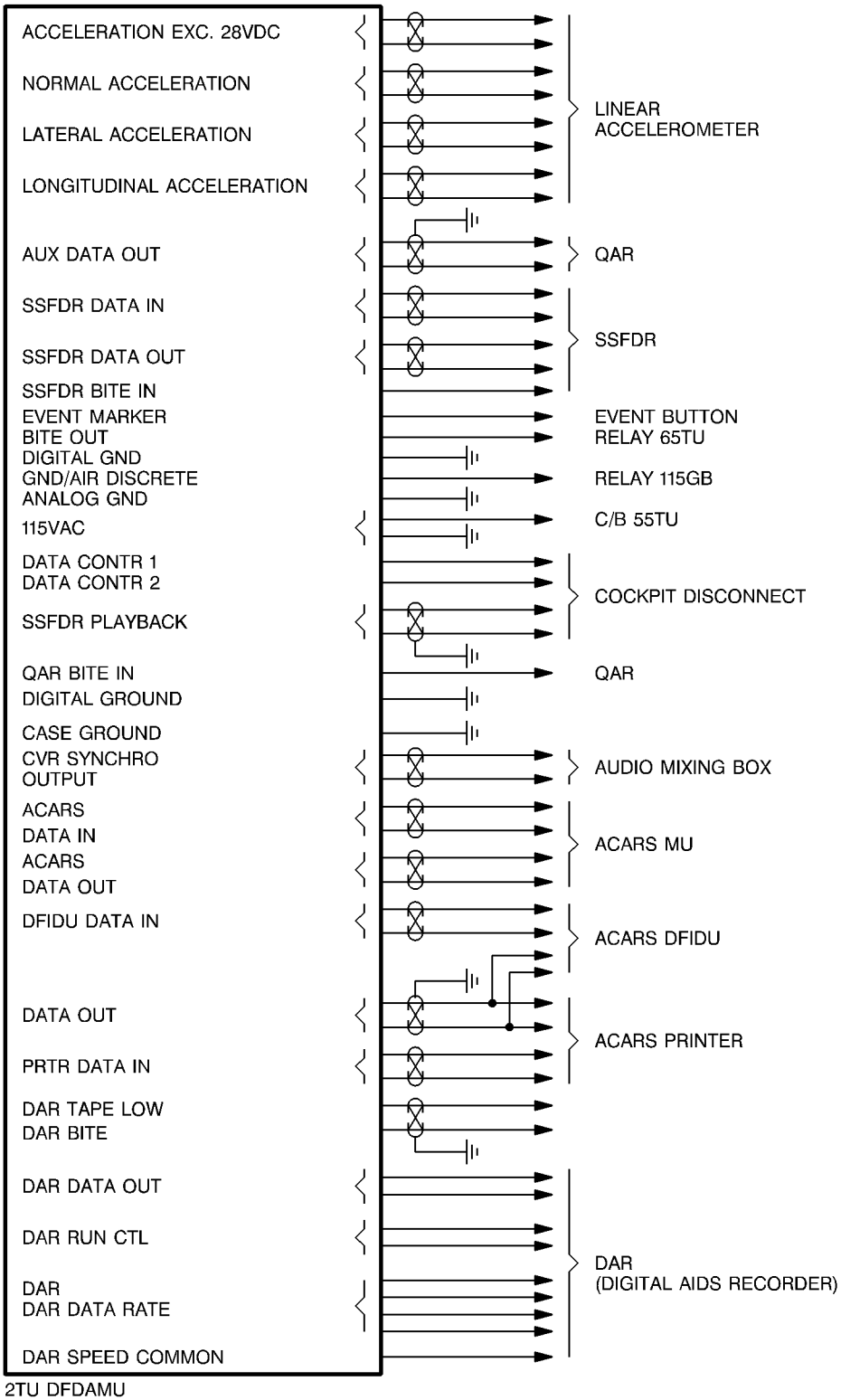
DFDAMU Block Diagram
Figure 010



BM6 31 31 00 0 ALGO 00

DFDAU System Internal Interface
Figure 011

R



BM6 31 31 00 0 BGC0 00

DFDAMU System Internal Interface
Figure 012

The format on this line is coded in HARVARD BIPHASE with 768 bits per second. An output for playback data is provided with 768 bits per second.

Status signals indicate the condition of the DFDR. Data and control lines to a copy recorder are installed. This interface access to the stored data via a high speed copying device.

(b)DFDR Functions

The received data is stored with 768 bits per second on the fire and shock protected tape. The continuous playback data is transmitted via the playback output to the DFDAU to allow a closed loop check. In addition a built-in-test-equipment (BITE) monitors the correct functioning of the recorder. In case of a failure the DFDR Status signal drives the CP indicator. The DFDR BITE signal is connected to the DFDAU. The data is stored on 1/4 inch wide, back-lubricated Mylar based tape. The tape is driven from reel to reel by a belt-coupled capstan. The tape reels are mounted coaxially with constant-force springs between them. The tape is guided from one reel over the EOT sensors, the record head, the capstan and the playback head to the other reel. The direction of the tape transport is switched automatically when EOT is detected. With the tape length of 465 feet, the speed 0.37 inch/sec. and using 6 tracks, 25 hours of recording is achieved. The amplified input data is switched to the respective record head to store the data on the magnetic tape. The assigned playback head signal is amplified and multiplexed to the output amplifiers. The playback signal is sent to the DFDAU via the low-speed output. The high-speed output is connected to the recopy recorder connector. The head selection is performed by the track and direction control logic.

NOTE : To ensure optimum quality of recordings, it is recommended when using copy recorders in association with the DFDR:

- to use new magnetic tapes, or
- to erase previous data prior to attempting new recording.

The externally selected tape speed is maintained constant by a servo controlled motor. The constant motor speed is performed by a motor tach pickup assembly and a speed (frequency) sensitive feedback loop.

(c)ULB

An Underwater Locator Beacon (ULB) is attached directly to the front panel of the DFDR. The beacon actuates upon immersion, in either fresh or salt water, at any depth up to 6000 meters. The ULB emits an acoustic signal with the frequency of 37.5 khz during a pulse length of more than 9msec. and at a pulse repetition rate of more than 0.9 pulse per second.

The ULB is servicable without disassembly of the DFDR. Maintenance has to be performed at determined time intervals to replace the battery for the ULB.

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

(2)Solid State Flight Data Recorder (SSFDR)
The SSFDR is in compliance with ARINC 717 and has the capability to store the last 25 hours of data which are collected by the DFDAMU.
The SSFDR functional block diagram illustrates the internal interconnection of the functional modules of the SSFDR.

(a)Interface
The data input is connected to the DFDAMU. The format on this line is in compliance to ARING 717 with a data rate of 128 words per second. An output for data echo (playback) is provided with the same data rate, code and content as the input data stream. Status signals indicate the the condition of the recorder.

(b)Functions
The data is stored in the Crash Survivable Memory Unit (CSMU) which contains solid-state flash memory devices. The recorder receives a 128 words/sec. data stream from the Digital Flight Data Management and Acquisition Unit (DFDAMU). The incoming data is recorded as it is received and is not aligned or processed in any way.
The continuous playback data is transmitted via the playback output to the DFDAMU to allow a closed loop check. In addition a Built-In-Test-Equipment (BITE) monitors the correct operation of the SSFDR. In case of a failure the SSFDR status signal drives the CTL PNL indicator. The SSFDR BITE signal is connected to the DFDAMU.

(c)Fast playback
For downloading the stored SSFDR data a Portable Interface (PI) is available. The PI is a PC based device, that houses the software necessary to download the contents of CSMU and to monitor the data parameters. The download of the stored SSFDR data with the PI is possible on aircraft without without removing the SSFDR.
The SSFDR is capable of downloading the entire 25 hours of stored data within 6 minutes.

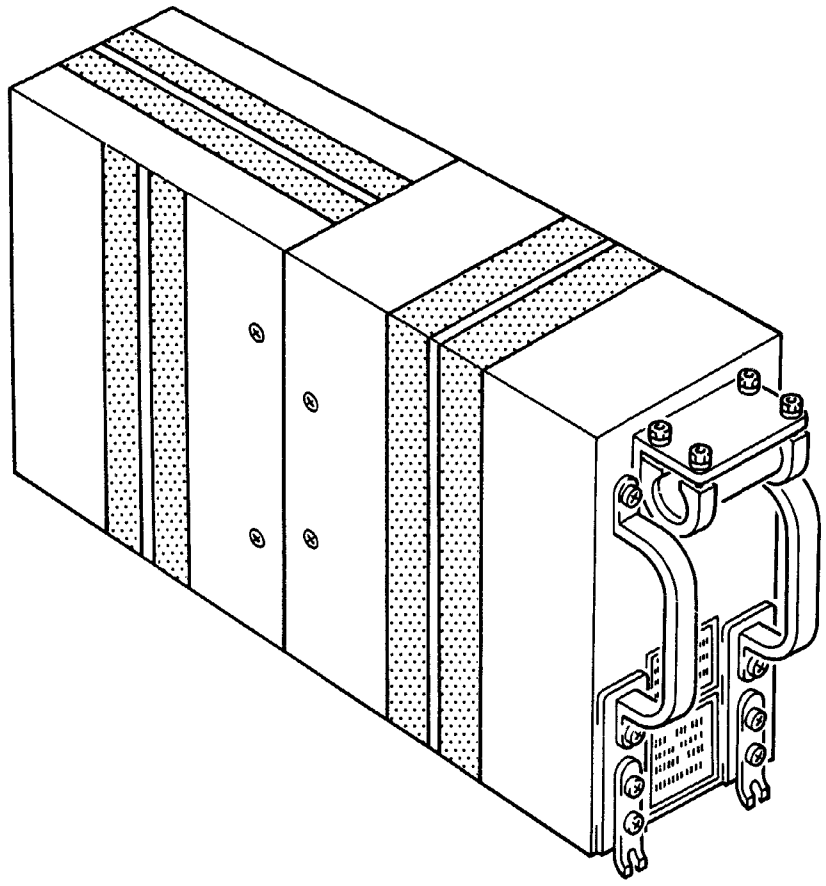
(d)ULB
An Underwater Locator Beacon (ULB) is directly attached to the front panel of the recorder. The beacon actuates upon immersion in either fresh or salt water of any depth to 6000 meters and has a detection range of 1800 to 3600 meters. The beacon emits an acoustic signal of 37.5 kHz during a pulse length of 10 msec and at a pulse repetition rate of 1 pulse per second. The ULB is serviceable without disassembly of the recorder. Maintenance has to be performed in determined time intervals to replace the battery for the ULB.

**ON A/C 101-200,

(Ref. Fig. 013)

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,



B M 6 3 1 3 1 0 0 0 C E Q 0 - 1 1

AIDS DFDR
Figure 013

(Ref. Fig. 014)

**ON A/C 101-200,

(Ref. Fig. 015)

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

(Ref. Fig. 016)

**ON A/C 101-200,

(Ref. Fig. 017)

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

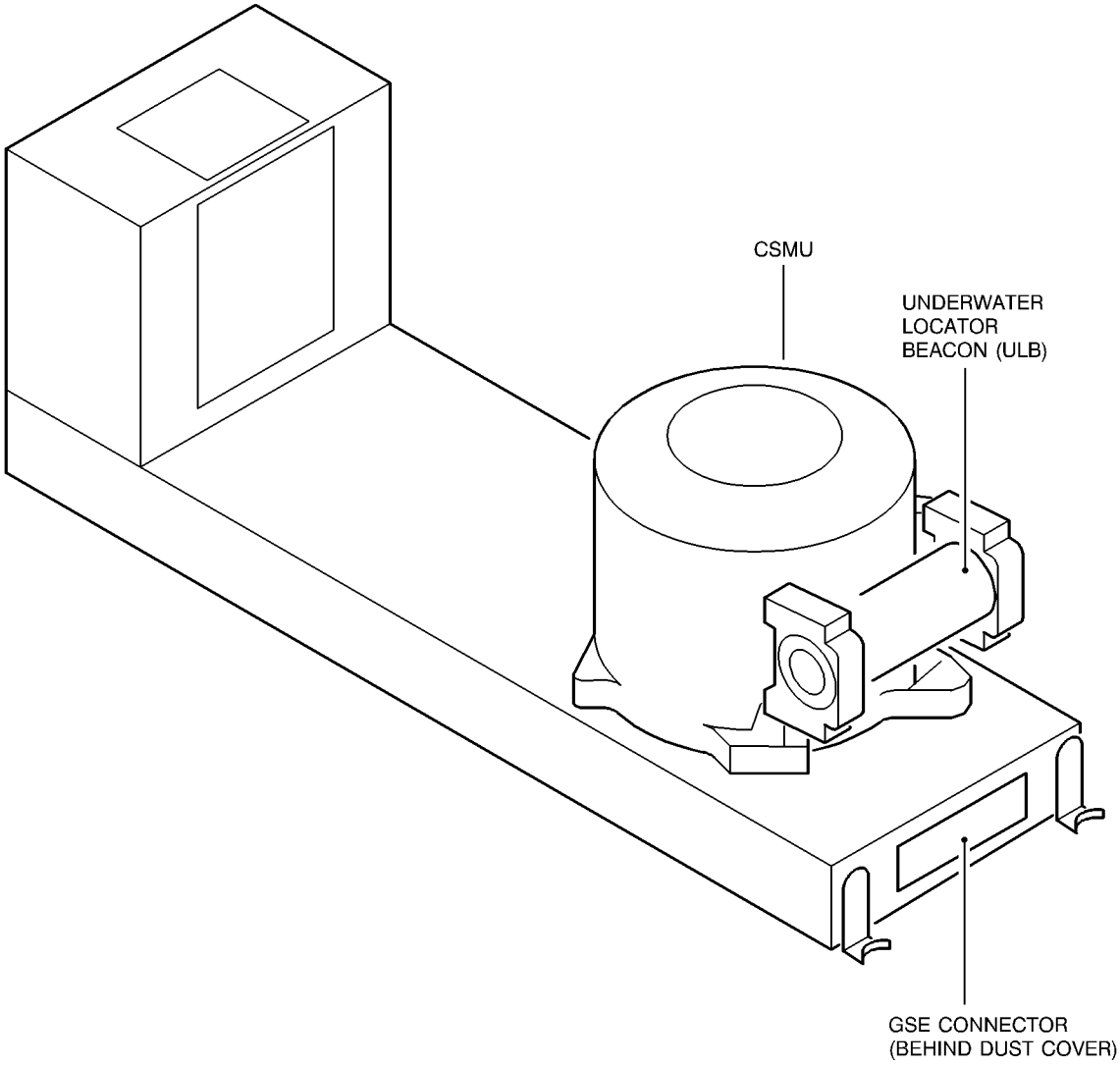
(Ref. Fig. 018)

**ON A/C 101-200,

(3)Linear Accelerometer (LA)
The force produced by an acceleration displaces a pendulum in the sensing mechanism. The displacement is sensed by a proximeter which generates a signal proportional in amplitude to the displacement. The signal is amplified by a servo-amplifier to excite a torque coil mounted on the pendulum. The current flowing through the torque coil produces a force directly proportional to the acceleration force.
The voltage drop across a load resistor, connected in series with the torque coil, is an accurate electrical analog of the acceleration and provides the input signal to the DFDAU.
The null output signal is raised by a required amount by the null offset circuit. At null, the lateral and longitudinal axis output signal is 2.6 V DC and the vertical output signal is 1.8 V DC.
Range of measurement:
- Vertical axis (z) = -3g to +6g
- Longitudinal axis (x) = 1g
- Lateral axis (y) = 1g

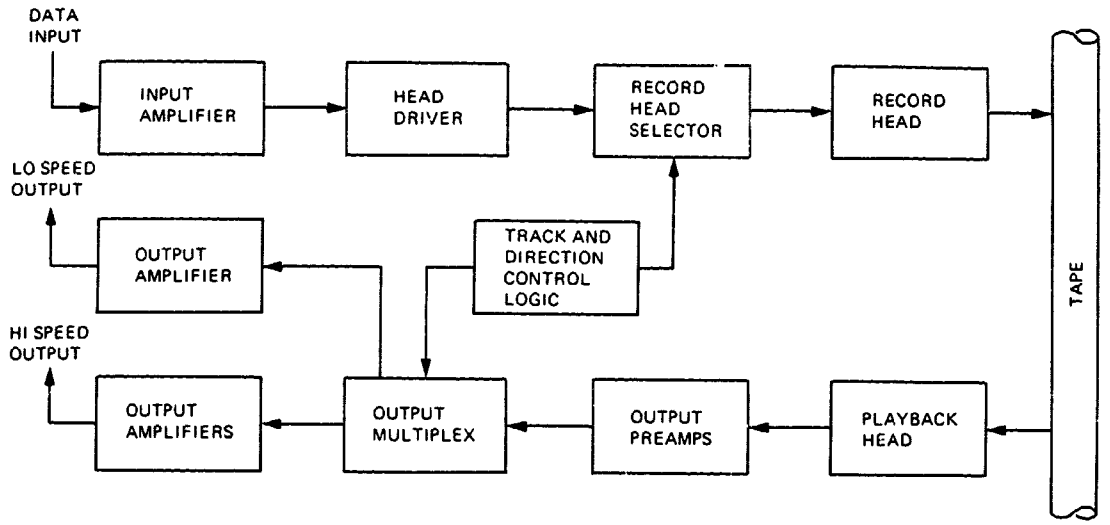
The output signal in terms of output volts per applied acceleration is shown in the detailed description of parameters No. 9, 10 and 11. The accelerometer is supplied by the DFDAU with 28 V DC.
The functional block diagram illustrates the structure on one LA single axis.
(Ref. Fig. 019, 020)

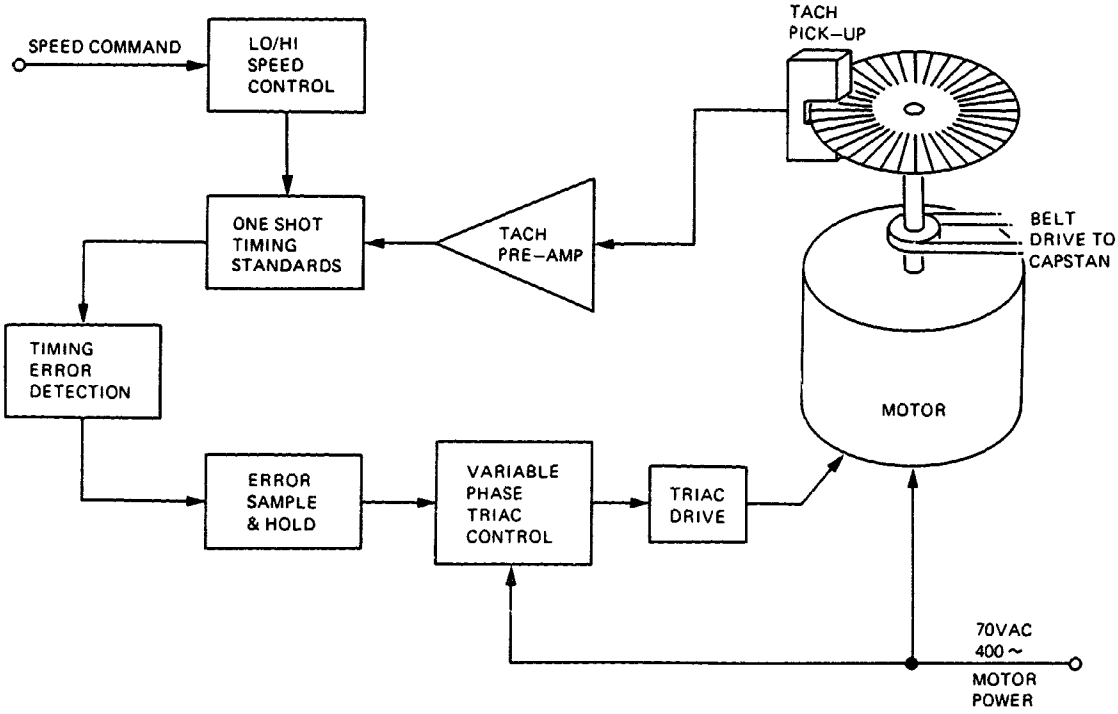
4. System Operation



BM6 31 31 00 0 BDD0 00

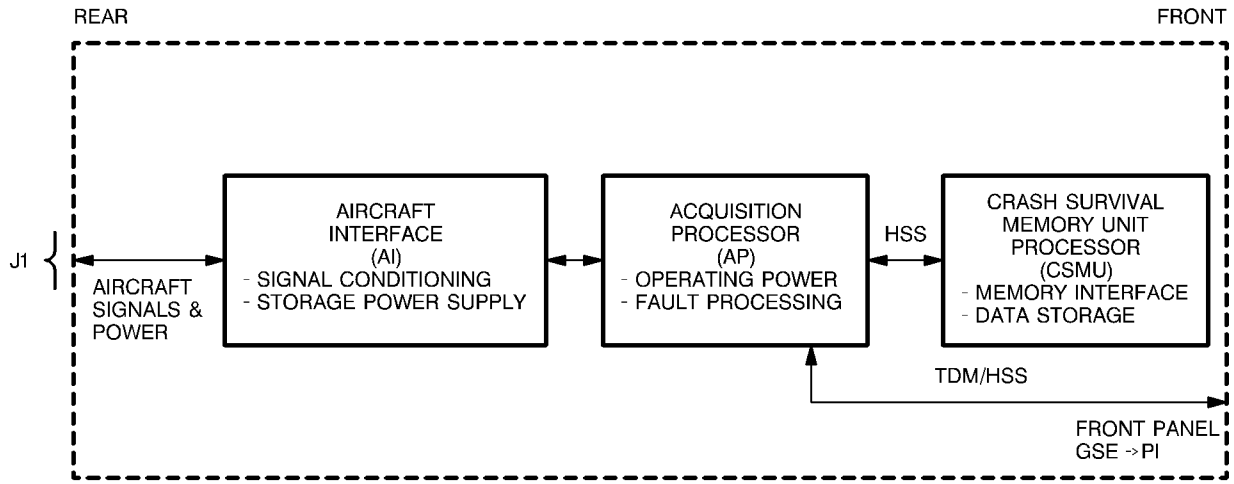
AIDS SSFDR
Figure 014





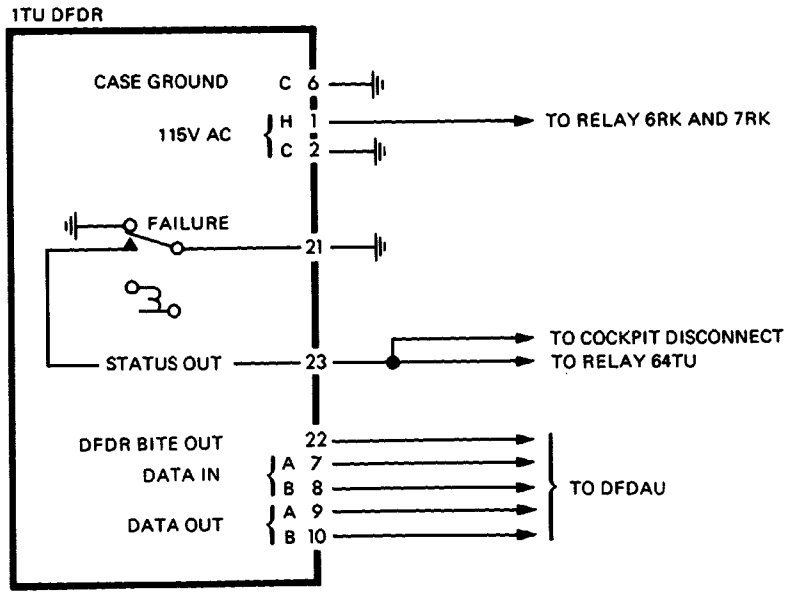
BM6 31 31 00 0CG P0–11

DFDR Block Diagram
Figure 015



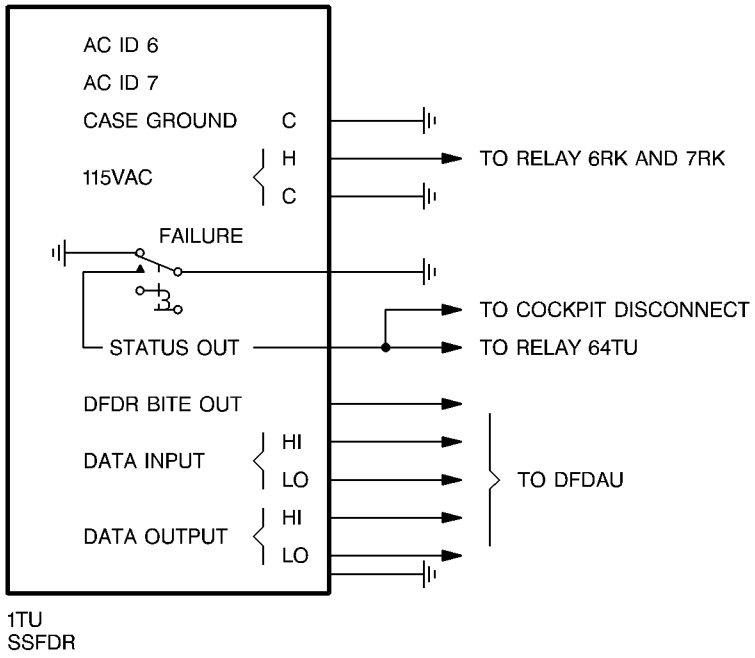
BM6 31 31 00 0 BDE0 00

SSFDR Block Diagram
Figure 016



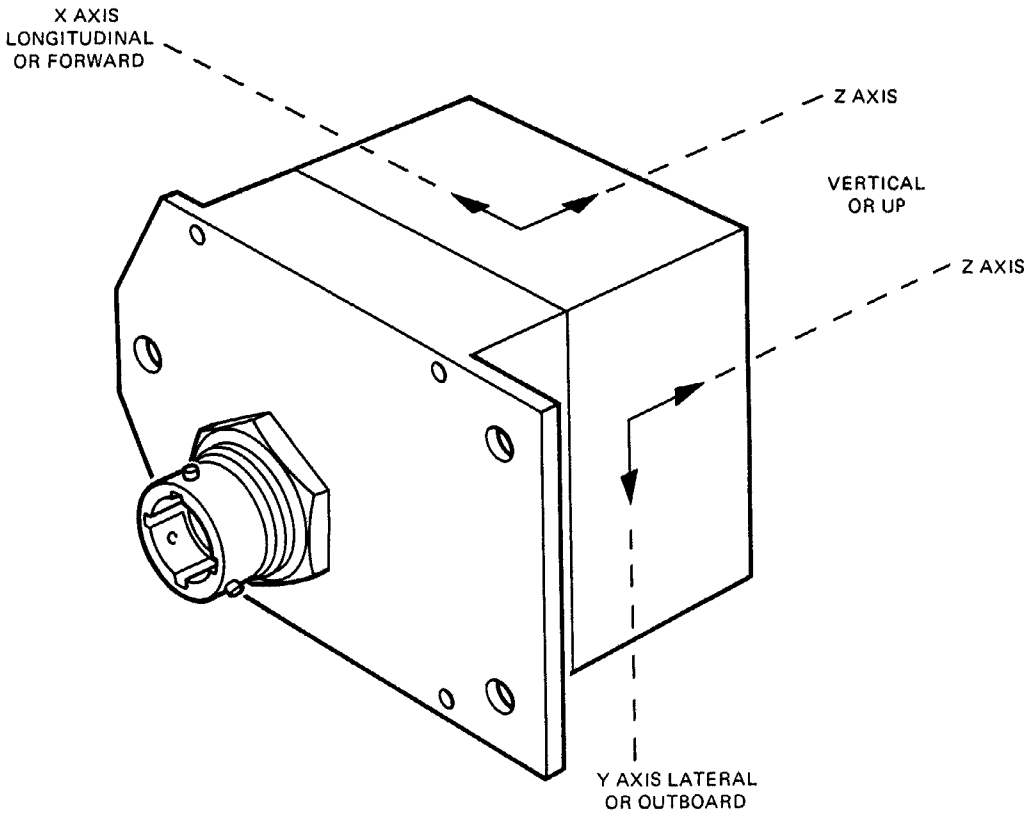
BM6 313100 0CJP0

DFDR System Internal Interface
Figure 017



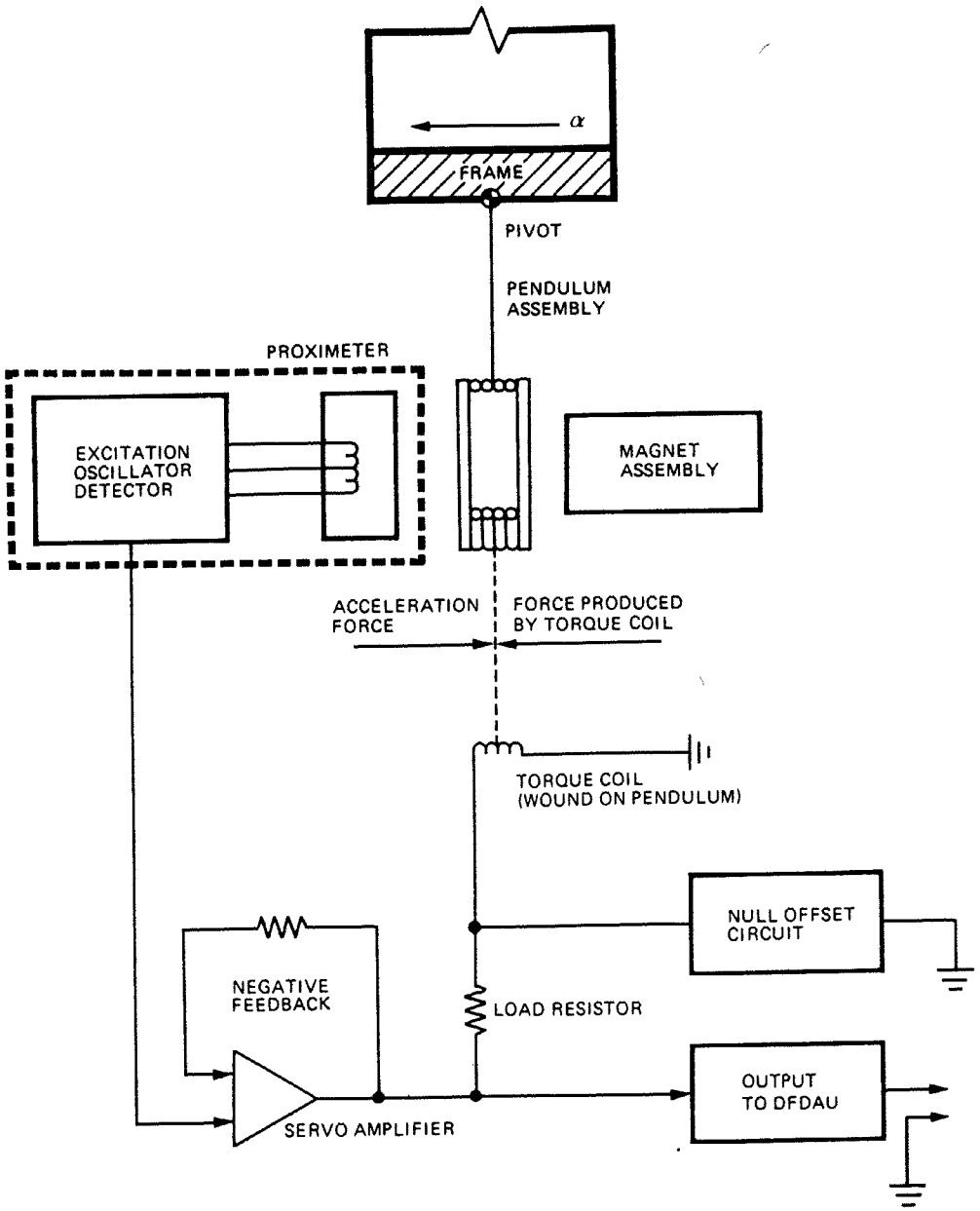
BM6 31 31 00 0 BDF0 00

SSFDR System Internal Interface
Figure 018



BM6 31 31 000 CAMO

AIDS LA
Figure 019



BM6 31 31 000 CCMO

LA Block Diagram
Figure 020

A. Energization
With the oil pressurization of one or both engines, the power interlock is released for supply of the DFDR with 115 V/400 Hz.The DFDAU is connected directly to the busbar.
The control panel lighting is connected to the aircraft dimmable supply.
CTL PNL indicators are supplied by a dimmable power bus.
For maintenance and test purposes on ground as well as for preflight checks, there is an override function to supply the DFDR.
When the GND/CTL button on the CTL PNL is pressed, the override function is held by a magnetic latch and the ON button comes on blue. The equipment will be supplied through this override function until the GND/CTL button is pressed again or the automatic power interlock is active.

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

4. System Operation

A. Energization
When the oil is pressurized of one or both engines, the power interlock is released for supply of the SSFDR with 115 V/400 Hz. The DFDAMU is connected directly to the busbar.
The control panel lighting is connected to the aircraft dimmable supply.
CTL PNL indicators are supplied by a dimmable power bus.
For maintenance and test purpose on ground as well as for preflight checks there is an override function to supply the SSFDR.
When the GND/CTL button on the CTL PNL is pressed, the override function is held by a magnetic latch and the ON button comes on blue. The equipment will be supplied through this override function until the GND/CTL button is pressed again or the automatic power interlock is active.

**ON A/C 101-200,

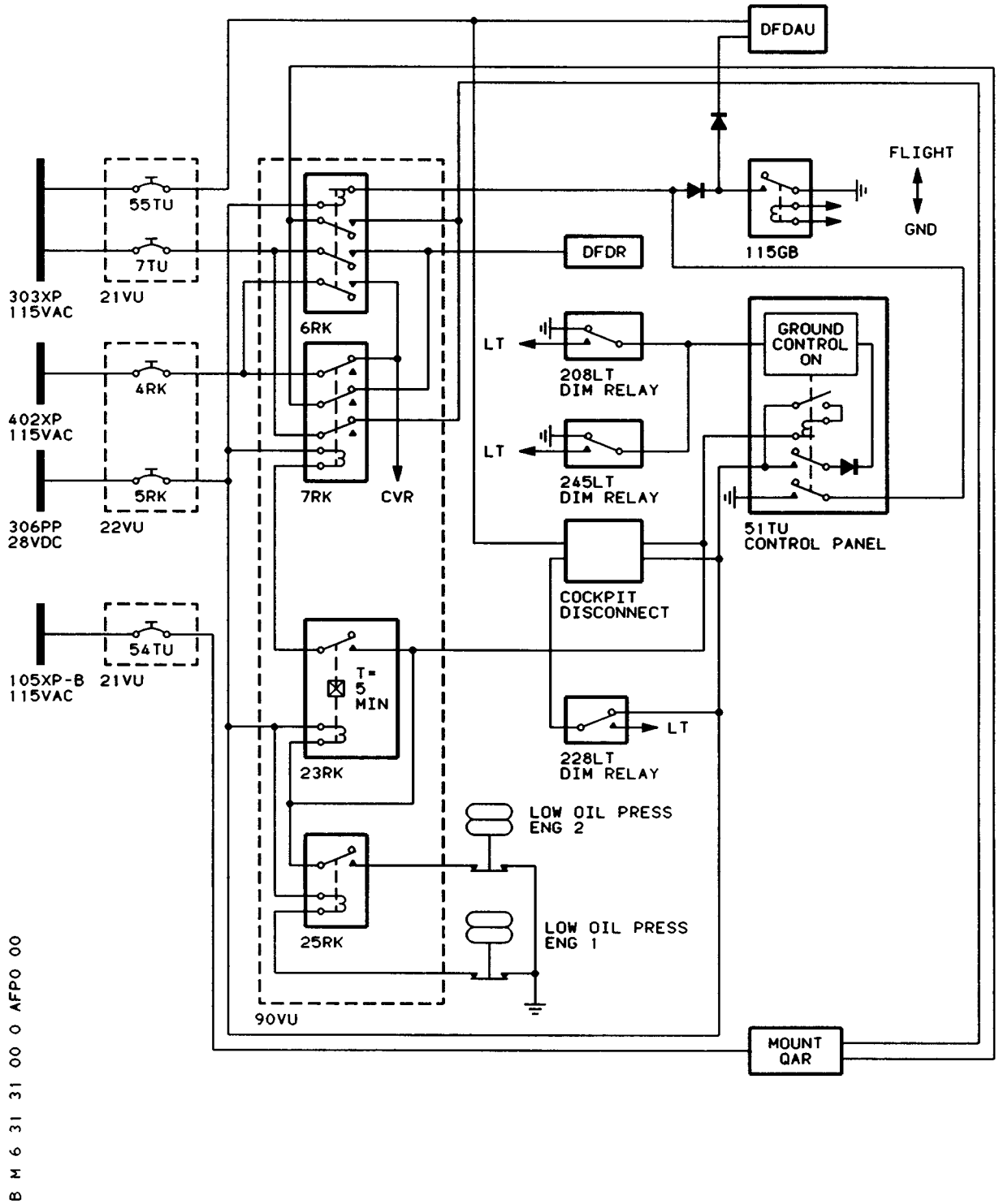
(Ref. Fig. 021)

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

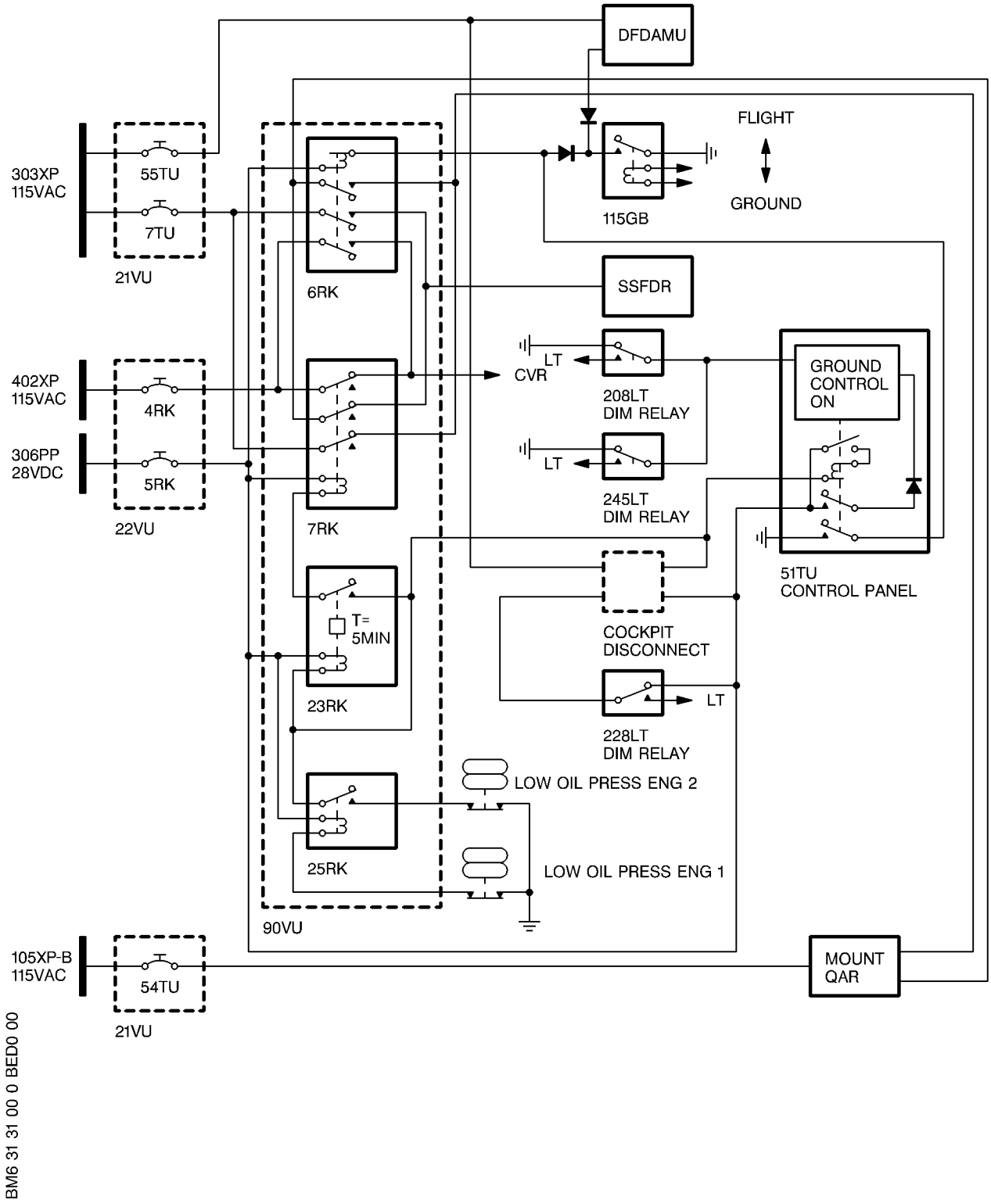
(Ref. Fig. 022)



B M 6 31 31 00 0 AFP0 00

AIDS Power Interlock
Figure 021

R



AIDS Power Interlock
Figure 022

**ON A/C 101-200,

B. Control
(1)Override of Power Interlock
With the magnetically latched GND/CTL button, it is possible to override the power interlock. In this manner, the system is ready for preflight checks or for maintenance and test purposes.
The power interlock override function should not be unnecessarily activated to avoid erasure of stored data.
(2)EVENT or PRINT/EVENT Button
An EVENT or PRINT/EVENT button is installed on the pedestal to record an EVENT MARK (see parameter No. 104) on the DFDR.

C. Indication
When the GND/CTL button on the control panel is pressed, the override function is held by a magnetic latch and the ON button comes on blue.
The status of the DFDAU and DFDR is shown by the DFDAU/DFDR indicator located on the control panel. In case of a DFDAU failure, the indicator DFDAU comes on yellow. This indicator is activated by the DFDAU BITE output. In case of a DFDR failure, the indicator DFDR comes on yellow, except when the DFDAU indicator is also activated. This indicator is initiated by the DFDR status output.
The DFDAU and DFDR status are also indicated on the front side of the DFDAU by two indicators.

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

C. Indication
When the GND/CTL button on the control panel is pressed the override function is held by a magnetic latch and the ON button comes on blue.
The status of the DFDAMU and SSFDR is shown by the DFDAU/DFDR indicator located on the control panel. In case of a DFDAMU failure, the indicator DFDAU comes on yellow. This indicator is activated by the DFDAMU BITE output. In case of a SSFDR failure the indicator DFDR comes on yellow except when the DFDAU indicator is also activated. This indicator is initiated by the SSFDR status output.
The DFDAMU and SSFDR status are also indicated on the front side of the DFDAMU by three indicators.
The status signals of SSFDR and DFDAMU are suppressed by a relay, activated by the nose gear shock absorber, during flight.

**ON A/C 101-200,

(Ref. Fig. 023)
(Ref. Fig. 024)

D. Lighting
The control panel is integrally illuminated. The illumination can be dimmed gradually by turning **OVERHEAD PANEL LIGHT** dim knob.

E. Monitoring
(1)Test
The operation of the power interlock and status monitoring can be tested by activating the 'manual **ON**' function. If no engine is running and **GND/CTL** is not pressed, the status lights of **DFDR** must be on. The pressed and magnetically latched **GND/CTL** button activates the power interlock by which the **DFDR** is energized. Correct functioning of the unit is indicated when **DFDR** status light is off. Because the **DFDAU** is supplied continuously, the status light of the **DFDAU** must be off.
To check correct functioning of the system, the monitoring function in each unit **(BITE)** is continuously active.
For test purposes, a line test connector is located on the **DFDAU** and **DFDR** front side. With a separate test set, the internal functions of **DFDAU** and **DFDR** can be checked.
(2)Monitoring
The **DFDAU** and **DFDR** are permanently monitored by the **BITE** of each unit under microprocessor control or respective circuitry.
The following items are monitored:
DFDAU
- operation of the microprocessor
- operation of the memories
- operation of the input/output functions
- operation of the **DFDR** playback signal
- operation of power supply circuitry

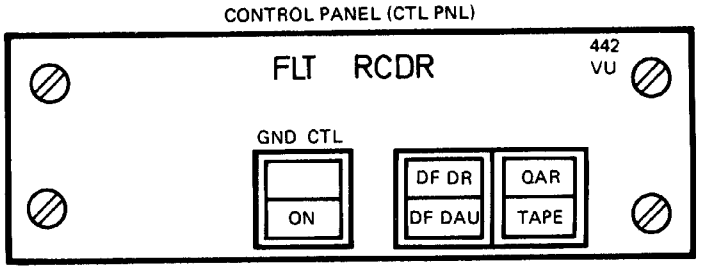
DFDR
- operation of tape motion
- operation of the input data stream
- operation of recorded data
- operation of power supply circuitry

When a failure is detected, the monitoring system illuminates the respective indication lights on the **CTL PNL**. Each unit also illuminates the respective fail light on its front side with the exception of the **DFDR** fail light which is located on the front side of the **DFDAU**.

R **ON A/C 101-104,

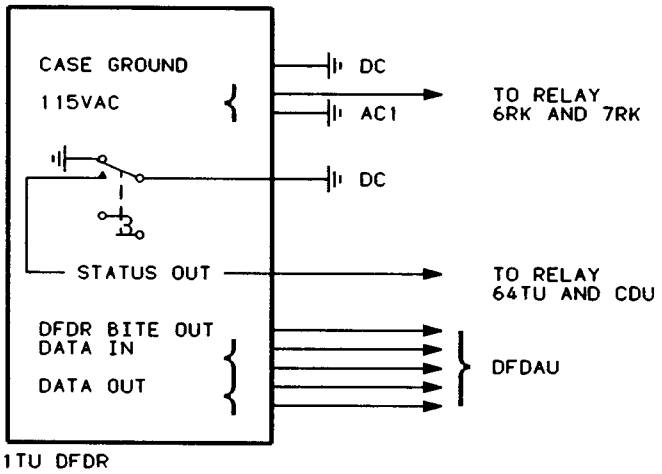
R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,



Control Panel
Figure 023

BM6 31 31 00 0ANP0



B M 6 31 31 00 0 CTSO 01

R

EVENT Button
Figure 024

D. Lighting
The control panel is integrally illuminated. The illumination can be gradually dimmed by turning **OVERHEAD PANEL LIGHT** dim knob.

E. Monitoring
(1)Test
The operation of the power interlock and status monitoring can be tested by activating the 'manual **ON**' function. If no engine is running and **GND/CTL** is not pressed, the status light of **DFDR** must be on. The pressed and magnetically latched **GND/CTL** button activates the power interlock by which the **SSFDR** is energized. Correct functioning of the unit is indicated when **DFDR** status light is off. Because the **DFDAMU** is supplied continuously, the status light of the **DFDAMU** must be off.
To check correct functioning of the system, the monitoring function in each unit **(BITE)** is continuously active.
With a separate test set, the internal functions of **DFDAMU** and **SSFDR** can be checked.
(2)Monitoring
The **DFDAMU** and **SSFDR** are permanently monitored by the **BITE** of each unit under microprocessor control or respective circuitry.
The following items are monitored:
DFDAMU
- operation of internal downlink
- operation of the microprocessor
- operation of the memories
- operation of the input/output functions
- operation of the **SSFDR** playback signal
- operation of power supply circuitry

SSFDR
- operation of the microprocessors
- operation of the input data stream
- operation of the memories
- operation of recorded data
- operation of power supply circuitry

When a failure is detected, the monitoring system illuminates the respective indication lights on the **CTL PNL** . Each unit also illuminates the respective fail light on its front side with the exception of the **SSFDR** fail light which is located on the front side of the **DFDAMU**.

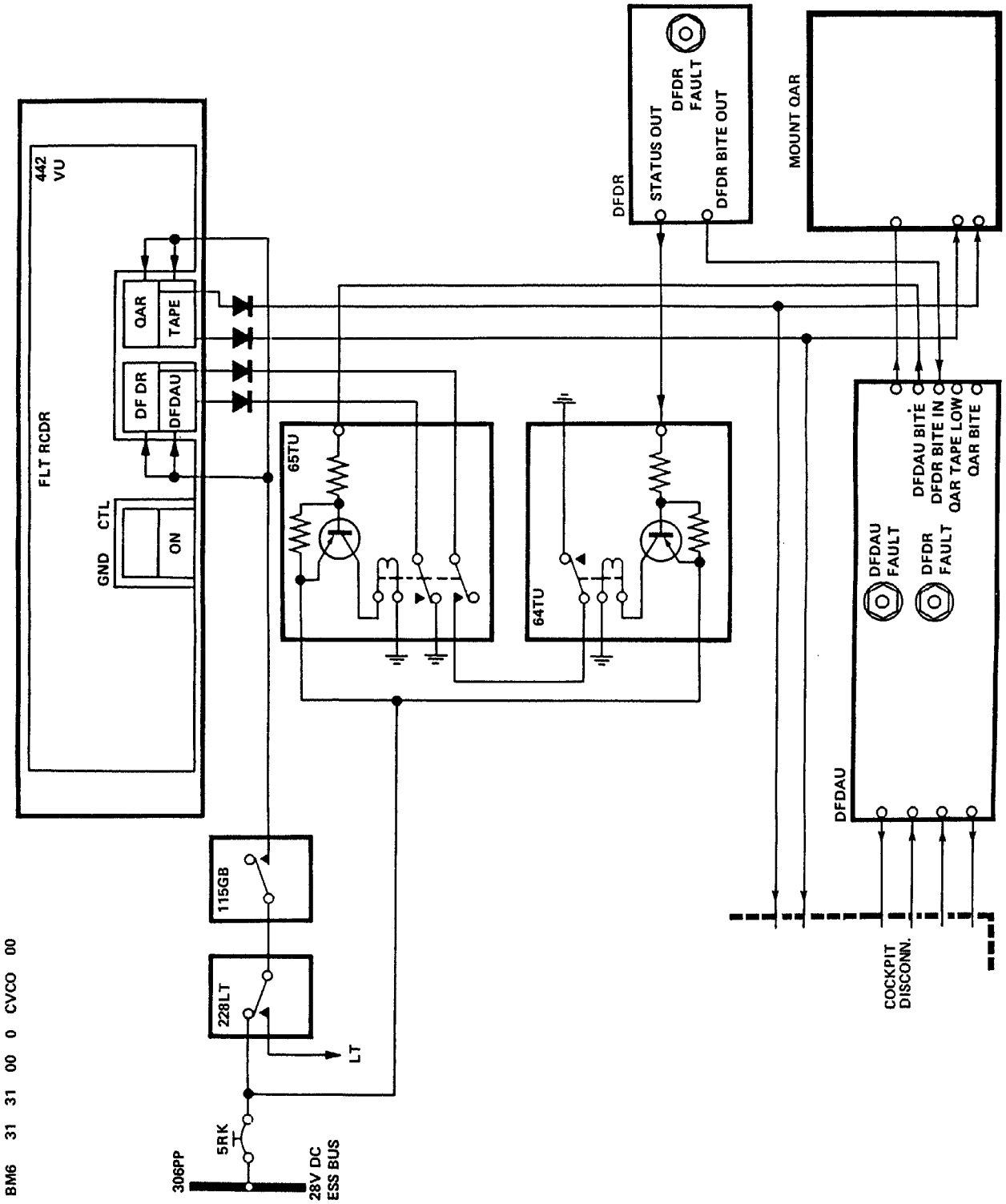
**ON A/C 101-200,

(Ref. Fig. 025)

R **ON A/C 101-104,

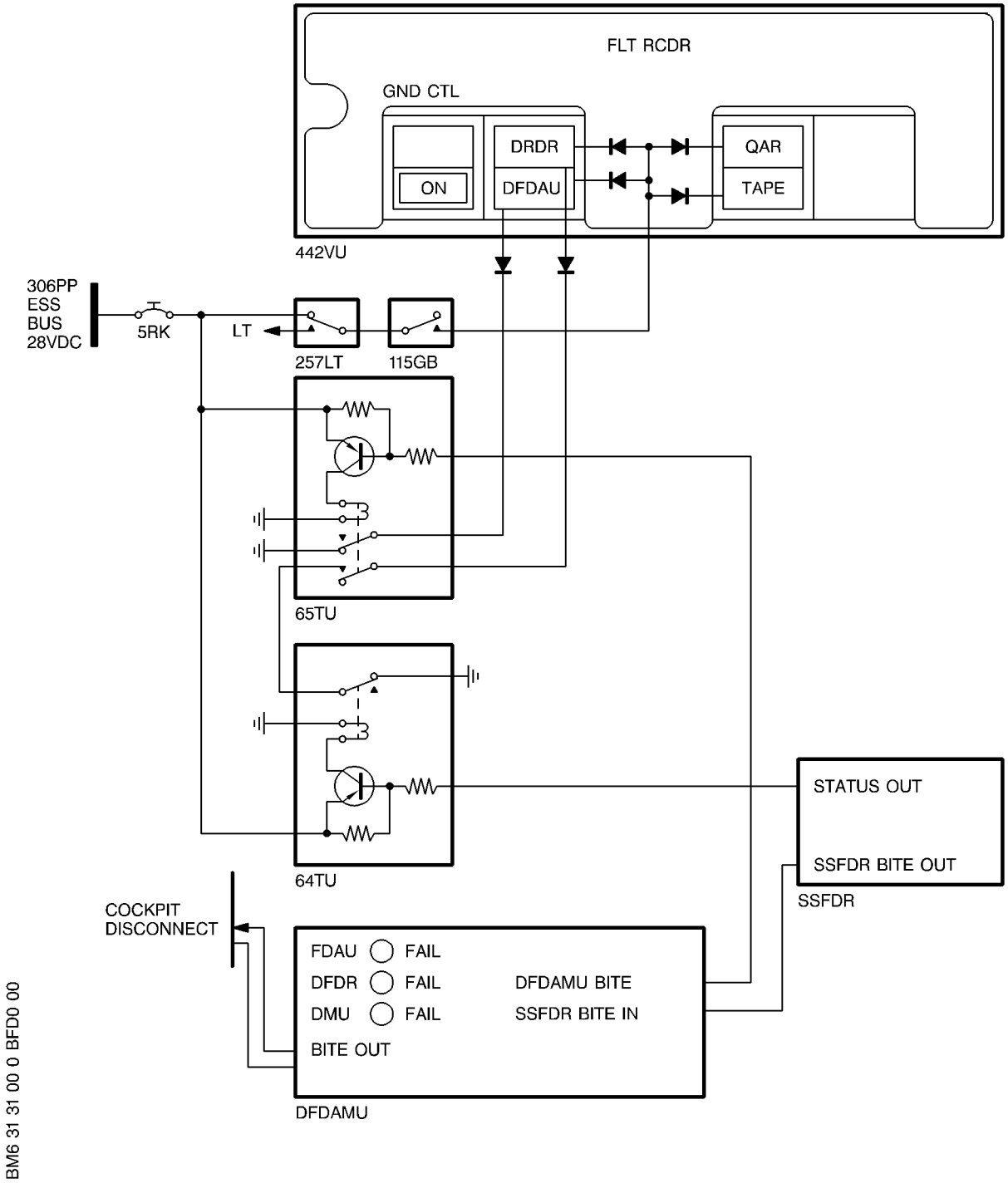
R Post SB 31-2116 For A/C 101-104,

R Post SB 31-2117 For A/C 101-104,



AIDS Fault Monitoring
Figure 025

(Ref. Fig. 026)



AIDS Fault Monitoring
Figure 026

R **ON A/C 001-003,

1. General
The purpose of the **AIDS** is the onboard recording of various critical flight parameters. In addition an expansion for data display, hard-copy printouts and data storage is installed. This stored and printed data is used to monitor the condition of the connected **A/C** systems in flight and to provide data for ground based performance monitoring and problem investigations.
The parameters are collected and converted by the **DFDAU**. The processed
R data is located in time slots on the serial output bus to **SSFDR**.
The **DFDAU** houses two independent computers to perform the mandatory data acquisition/recording functions and the data management functions.
The parameters for recording are collected and converted by the **DMU** part of the **DFDAU**. The processed data is located in time slots on the serial
R output bus to the **SSFDR** and the **QAR** .
The **DMU** part of the **DFDAU** receives additional digitalized parameters from various systems. This partition processes and analyses flight data and provides data for the **QAR** . The software also controls the recording of the **QAR**.

R **ON A/C 004-100,

1. General
The purpose of the **AIDS** is the onboard recording of various critical flight parameters. This stored data is also applicable to monitor the condition of the connected **A/C** systems. The parameters are collected and converted by the **DFDAU**. The processed data is located in time slots on the serial output bus
R to the **SSFDR** and the **QAR**.

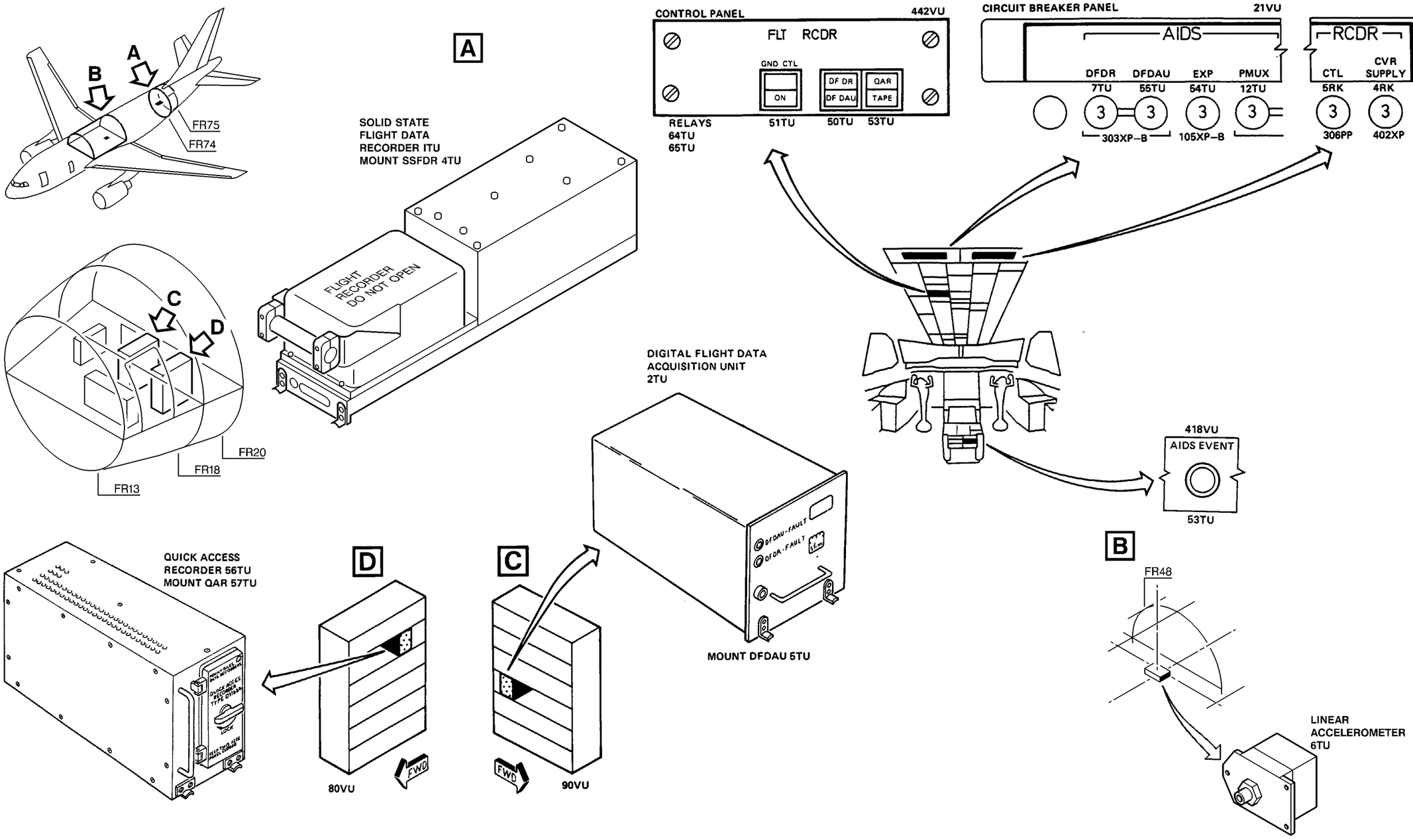
R **ON A/C 001-100,

2. Component Location
R (Ref. Fig. 001)

	FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
R	1TU	SOLID STATE FLIGHT DATA RECORDER		171		31-31-35
	4TU	MOUNT, DFDR		171		
	2TU	DIGITAL FLIGHT DATA ACQUISITION UNIT	94VU	122		31-31-15
	5TU	MOUNT, DFDAU	94VU	122		
	6TU	LINEAR ACCELEROMETER		145		31-31-16
		CONTROL PANEL	442VU	210		
	50TU	MONITORING INDICATOR DFDR/DFDAU ON CTL PNL	442VU	210		
	51TU	CONTROL AND MONITORING INDICATOR GND CTL/ON ON CTL PNL	442VU	210		
	56TU	QUICK ACCESS RECORDER	82VU	121		31-32-65

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
57TU	MOUNT, QAR	82VU	121		
52TU	SWITCH, EVENT	418VU	210		
53TU	MONITORING INDICATOR QAR/TAPE ON CTL PNL	442VU	210		
64TU	RELAY	442VU	210		
65TU	RELAY	442VU	210		

NOTE : For component locations of equipment which is not part of this system refer to respective chapters, eg. RK-COM./COCKPIT VOICE RECORDER.



BM6 31 31 00 0 BAA0 00

R

AIDS COMPONENT LOCATION
Figure 001

3. System Description

A. System Architecture

The AIDS consists of a basic installation of:

- a digital flight data acquisition unit (DFDAU)
- a solid state flight data recorder (SSFDR)
- a control panel (CTL PNL)
- a linear accelerometer (LA)
- a quick access recorder (QAR)

The basic equipment has to be installed to fulfil the requirements of the authorities for recording of mandatory parameters.

With the expansion equipment the processing of flight data is performed to generate hard-copy prints and to store diagnostic data on the respective recorder.

A propulsion data multiplexer (PMUX) is installed on each engine to collect the engine data which are required to execute the engine condition monitoring (ECM).

R **ON A/C 004-100,

R (Ref. Fig. 002)

R **ON A/C 001-003,

R (Ref. Fig. 003)

R **ON A/C 001-100,

B. System Power Supply

The units are supplied by the A/C generated power supply where characteristics as noted in ARINC 413A are permissable.

The DFDAU and the QAR are supplied from the busbar via circuit breakers.

The power supply of the SSFDR and the run of the QAR are controlled by the power interlock. The LA is directly supplied from the DFDAU.

PMUX1 and PMUX2 are connected to the 28V DC busbar, via circuit breaker.

The supply of the power interlock relays is achieved via circuit breaker 5RK. For power interlock description refer to subsection energization.

The busbar connection is as listed below.

ITEM	VOLTAGE	BUSBAR	CIRCUIT BREAKER
R SSFDR	115V AC	303XP ESS	7TU
DFDAU	115V AC	303XP ESS	55TU
LA	28V DC	Power supply included in DFDAU	
PMUX	28V DC	111PP NORM	12TU
QAR	115V AC	105XP NORM	54TU

R (Ref. Fig. 004)

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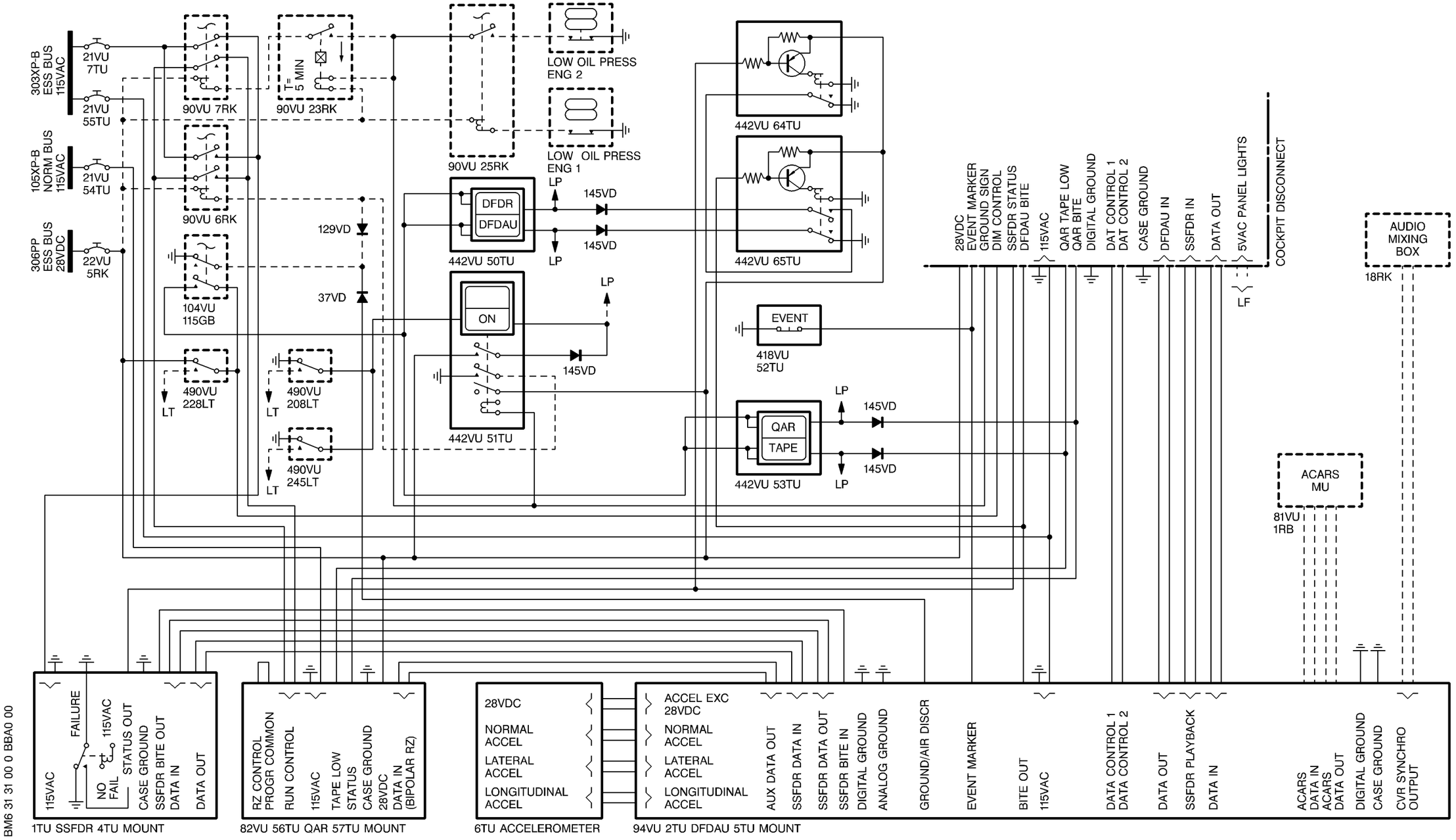


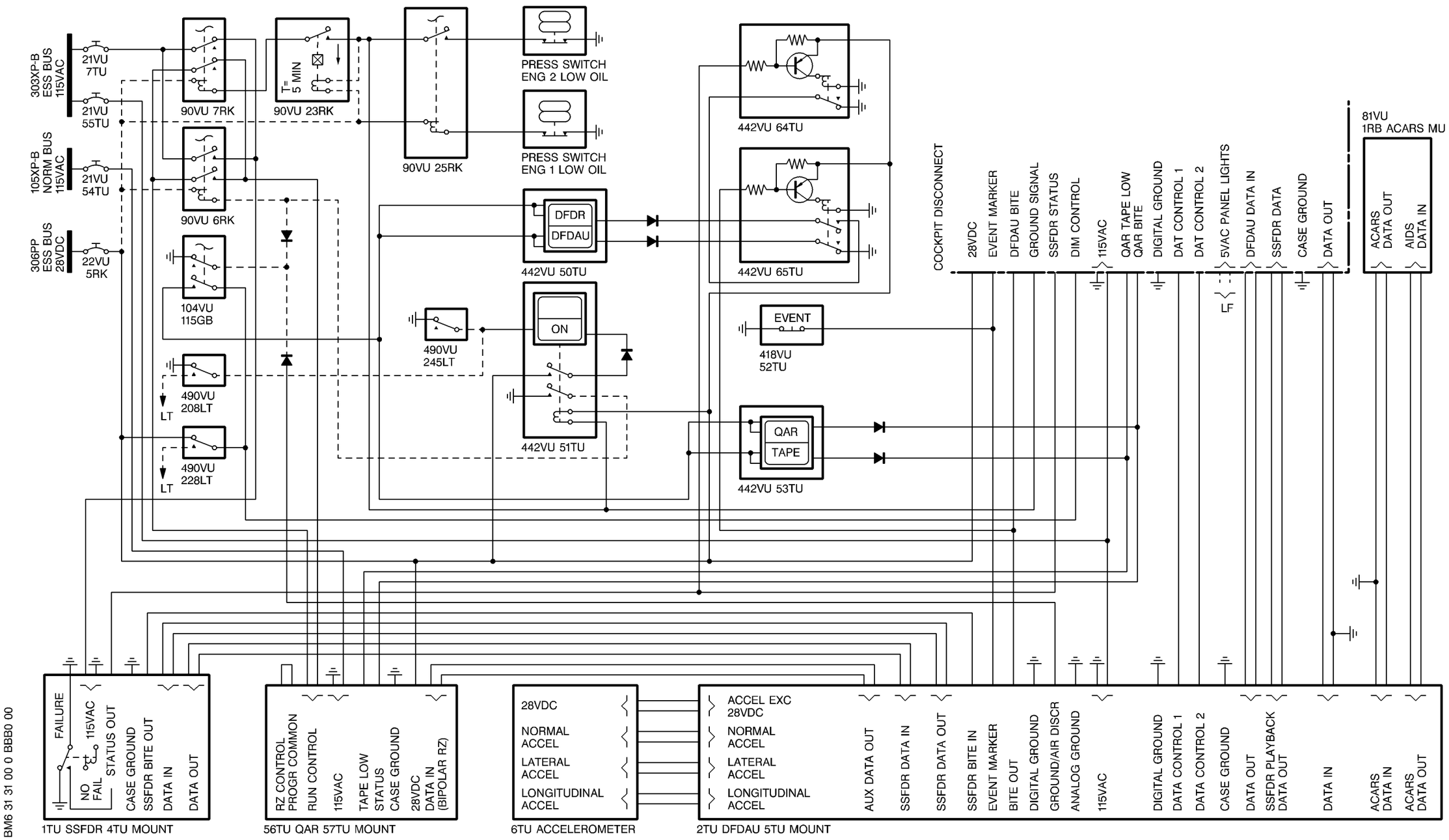
BM6 31 31 00 0 BBA0 00

AIDS INTERCONNECTION SCHEMATIC
Figure 002

R

EFFECTIVITY: 004-100,

PIA



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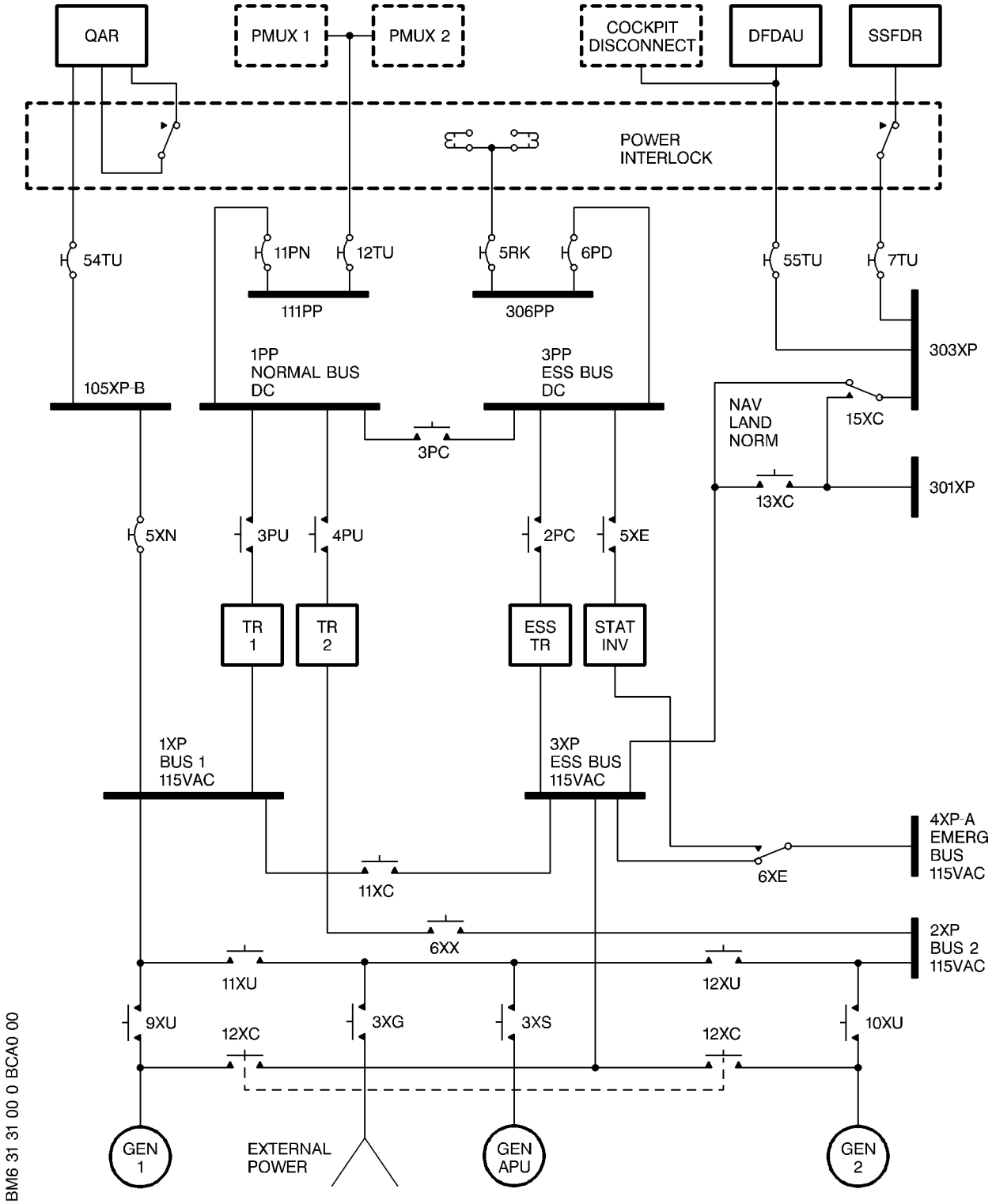
AIDS INTERCONNECTION SCHEMATIC
Figure 003

R



BM6 31 31 00 0 BCA0 00

AIDS Power Supply
Figure 004

R

R **ON A/C 001-003,

C. Component Description
(1)Digital Flight Data Acquisition Unit (DFDAU)
The DFDAU is a microcomputer-controlled unit with modules for the collection of analog, discrete and digital parameters and their conversion to a recordable form. The function and the interface complies with ARINC 717. The DFDAU functional block diagram illustrates the internal interconnection of the functional modules of the DFDAU.
(a)Input Characteristics
1 Parameter inputs
60 type programmable analog inputs for:
- SYNCHRO
- ACR1
- ACR2
- DC VOLTAGE
- DC RATIO
- RESISTANCE PROBE (inputs 45 to 60) with the appropriate reference inputs and outputs
Accuracy: better than 0.2%
Expandable to 84 inputs.

99 discrete inputs
- 20 SHUNT
- 50 SERIES
- 8 AC SENSITIVES
- 3 MARKER BEACON
- 18 IDENT

16 DITS - ARINC 429 input ports
- 12 LOW SPEED (12 to 14 Kbit/s)
- 4 PROGRAMMABLE LOW/HIGH SPEED (low: 12 to 14 Kbit/s, high: 100 Kbit/s)
Expandable to 32 input ports
Software data selection.

2 System inputs
R SSFDR PLAYBACK DATA input
R - playback of SSFDR data for verification
R SSFDR BITE IN
R - status line from SSFDR
GND/AIR DISC
- ground/air status of the aircraft

(b)Output Characteristics
R SSFDR
- 64 words per second, 12 bit each
- HARVARD BIPHASE CODE
R SSFDR Playback Data
R - transmission of playback data, received from SSFDR
ASYNCHRONOUS
- output for test purpose or optional printer in RS 232 (9600 BAUD) characteristic.

STATUS
- signal line to indicate the status of the DFDAU on the CTL PNL

QAR
- auxiliary output, 64 words per second, 12 bits each
- RZ BIPOLAR CODE

ASYNCHRONOUS
- output for test purpose or optional printer according to ARINC 573

(c) Input/Output Interface Characteristics

The DFDAU is provided with a dedicated ARINC 429 input/output pair for communication with the CDU. The method of communication is ARINC 429 file transfer protocol.

(d) DFDAU Functions

The software controlled functions of the DFDAU are as follows:
- analog parameters type selection
- analog and discrete parameter selection
- calibration control
- selection of parameters from ARINC 429 buses
- formatting of SSFDR/QAR data output
- processing of SSFDR playback
- execution of Built-In-Test (BITE)
- data processing for CDU
- control of ARINC 429 input/output for CDU interface
- execution of the integrity check for mandatory parameters

Acquisition circuitry is provided for analog, discrete and ARINC 429 parameters. The inputs are protected against overvoltages and cross wiring.

The acquisition circuits also provide filtering, amplification, isolation and conversion of the input signals.

The analog inputs are type programmable. The received signals are converted and digitized, depending on the programmed input type. The values are stored and updated in memory for further processing.

The circuitry for acquisition and conversion of the analog signals is concentrated in the analog input interface module.

The ON/OFF signals are sampled according to the connection as series or shunt discretes. The status of these signals is stored and updated in memory.

The circuitry for acquisition and conversion of the discrete ON/OFF signals is concentrated in the discrete input interface module.

The received ARINC 429 parameters (16 buses) are multiplexed and stored in the respective storage memory depending on input port, label and SDI.

The circuitry for acquisition and conversion of the ARINC 429 bus data is concentrated in the DITS input interface module.

The interface circuitry for the ARINC 429 file transfer communication with the CDU is grouped in the CDU interface module.

The circuitry for the control of the status indicator on the CTL PNL and for data transmission to the SSFDR, QAR and DMU is concentrated in the output interface module.

The microprocessor generates the output formats for SSFDR, QAR (identical to SSFDR), test device and CDU.

These formats are updated with the received values. The processing and memory circuits for centralized data handling and for control of the interface modules are concentrated in the processor module. In this module also the execution of the programmed functions is performed.

R (e)Verification of SSFDR Playback Data
To verify the recorded data, the DFDAU receives the playback data via a serial databus.
This data is generated from a separate read-after-write head.
The received playback data is compared with the DFDAU output data. In case of discrepancies the respective BITE flag is
R activated. The interface circuitry for SSFDR playback data is
R grouped in the SSFDR playback module.

(f)Identification of Location
The DFDAU is capable of recognizing on which aircraft it is installed by decoding the identification discretes. Parameter selection and data processing depend on this identification code. For aircraft type and fleet identification 18 IDENT DISCRETES are provided.

(g)Integrity Check of Mandatory Parameters
The integrity check consists of two parts, a check of correct operation of the recorder and the reasonableness range check on mandatory parameters.
The correct operation of the recorder is tested by monitoring the sync words in the recorder playback data. The reasonableness range check is performed on mandatory parameters (parameter no. 1 to 44). These parameters are checked for a defined range at a defined segment of the flight profile.
R The results of these tests are recorded in word 62 of the SSFDR frame and available via the CDU.
An indicator is located on the DFDAU front panel, which shows the results of the integrity check (pass/fail) after keeping the test push-button depressed for more than 3 seconds.

R **ON A/C 004-100,

R C. Component Description
R (1)Digital Flight Data Acquisition Unit (DFDAU)
R The DFDAU is a microcomputer-controlled unit with modules for the collec-
R tion of analog, discrete and digital parameters and their conversion to a
R recordable form. The function and the interface complies with ARINC 717.
R The DFDAU functional block diagram illustrates the internal interconnec-
R tion of the functional modules of the DFDAU.
R (a)Input Characteristics
R 1 Parameter inputs
R 60 type programmable analog inputs for:
R - SYNCHRO
R - DC VOLTAGE
R - DC RATIO
R - RESISTANCE PROBE (inputs 45 to 60) with the
R appropriate reference inputs and outputs
R Accuracy: better than 0.2%
R Expandable to 84 inputs.
R 88 discrete inputs
R - 20 SHUNT
R - 50 SERIES

R - 8 AC SENSITIVES
R - 3 MARKER BEACON
R - 18 IDENT
R 24 DITS - ARINC 429 input ports
R - LOW SPEED (12 to 14 Kbit/s)
R - 7 DITS - ARINC 429 input ports
R - HIGH SPEED (100 Kbit/s)
R 2 System inputs
R SSFDR PLAYBACK DATA input
R - playback of SSFDR data for verification
R SSFDR BITE IN
R - status line from SSFDR
R GND/AIR DISC
R - ground/air status of the aircraft
R (b)Output Characteristics
R SSFDR
R - 64 words per second, 12 bit each
R - HARVARD BIPHASE CODE
R SSFDR Playback Data
R - transmission of playback data, received from SSFDR
R ASYNCHRONOUS
R - fully duplex RS 232 link for communication with a test device
R STATUS
R - signal line to indicate the status of the DFDAU on the CTL PNL
R QAR STATUS
R - 2 signal lines to indicate the status of the QAR on the CTL PNL
R QAR
R - auxiliary output, 64 words per second, 12 bits each
R - RZ BIPOLAR CODE
R CVR SYNC output
R - audio output which is encoded with GMT time to the CVR
R (c)Input/Output Interface Characteristics
R The DFDAU is provided with a dedicated ARINC 429 input/output pair for
R communication with the CDU. The method of communication is ARINC 429
R file transfer protocol.
R (d)DFDAU Functions
R The software controlled functions of the DFDAU are as follows:
R - analog parameters type selection
R - analog and discrete parameter selection
R - calibration control
R - selection of parameters from ARINC 429 buses
R - formatting of SSFDR/QAR data output
R - processing of SSFDR playback
R - execution of Built-In-Test (BITE)
R Acquisition circuitry is provided for analog, discrete and ARINC 429
R parameters. The inputs are protected against overvoltages and wiring
R inversions.
R The acquisition circuits also provide filtering, amplification, iso-
R lation and conversion of the input signals.
R The analog inputs are type programmable. All analog and discrete inputs
R are sequentially sampled, signal conditioned and converted to digital

R values. The converted analog signals are stored and updated in a data
R output field for SSFDR output processing.
R The discrete ON/OFF signals are sampled according to the connection as
R series or shunt discretes. The status of these signals is stored and
R updated in memory.
R (e)Selection of Parameters from ARINC 429 buses.
R The received ARINC 429 parameters are multiplexed and stored in the re-
R spective storage memory depending on input port, label and SDI. The
R microprocessor generates the output formats for the SSFDR QAR and test
R device. These formats are updated with the received values.
R (f)Formatting of SSFDR Data Output
R Data to the SSFDR is transmitted continuously in HARVARD BIPHASE CODE
R at a rate of 768 bits per second. The output data is organized in
R frames of 4 seconds. Each frame consists of 4 subframes with 64 words
R each. One word of output data contains 12 bits. The parameters are
R assigned to specific word slots of the subframes.
R Converted analog signals or digital values occupy 10 or alternatively
R 12 bits of an output word. The discrete information is assigned to the
R remaining 2 bits of the 10 bit values. The output data contains a run-
R ning frame counter to allow detection of short time data loss at ground
R processing. This frame counter is incremented by one every frame.
R In order to accommodate the recording of documentation data superframes
R are created in the data output format. The superframe 1 is recorded in
R word 56, subframe 1, superframe 2 in word 57, subframe 1, superframe 3
R in word 41, subframe 4 and superframe 4 in word 51, subframe 3 with
R different assignment over 16 frame cycles.

R (g)Verification of SSFDR Playback Data
R To verify the recorded data, the DFDAU receives the playback data
R via a serial databus.
R This data is generated from a separate playback circuit.
R The received playback data is compared with the DFDAU output data.
R In case of discrepancies the respective BITE flag is activated and
R a failure is indicated on the DFDAU front side fault light. To allow
R the installation of a SSFDR without playback signal, the playback
R verification in the DFDAU can be suppressed by a discrete input
R (parameter No. 389).
R (h)Identification of Location
R The DFDAU is capable of recognizing on which aircraft it is installed
R by decoding the identification discretes. Parameter selection and data
R processing depend on this identification code. For aircraft type and
R fleet identification 18 IDENT DISCRETES are provided.

**ON A/C 001-003,

(Ref. Fig. 005)

**ON A/C 004-100,

(Ref. Fig. 006)

**ON A/C 001-003,

(Ref. Fig. 007)

**ON A/C 004-100,

(Ref. Fig. 008)

**ON A/C 001-003,

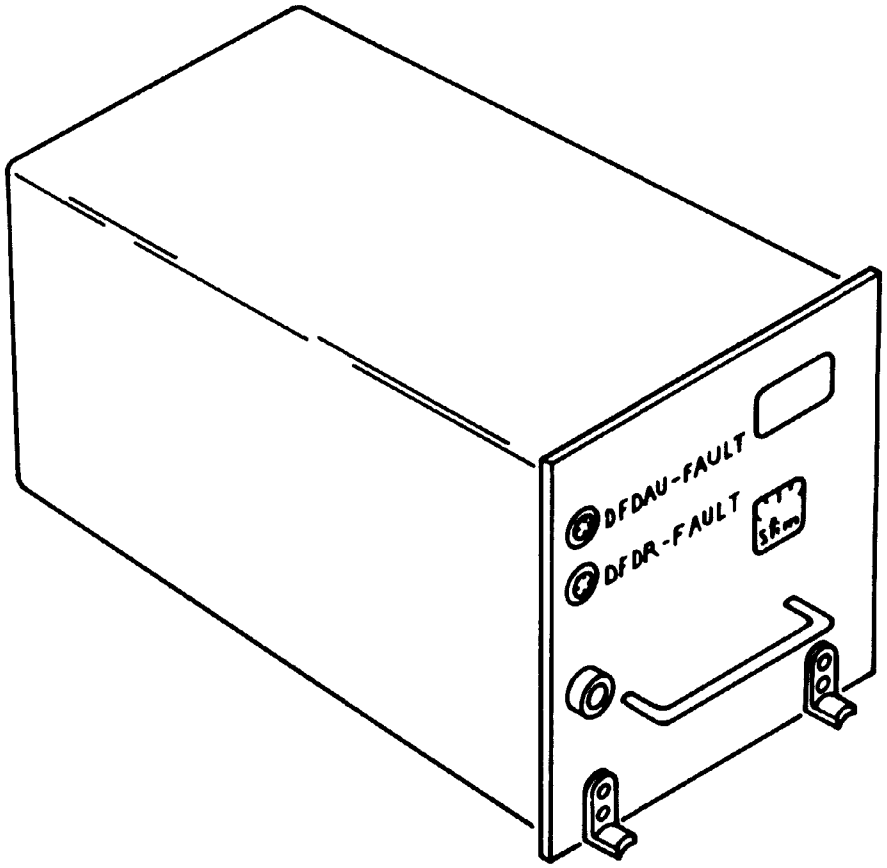
(Ref. Fig. 009)

**ON A/C 004-100,

(Ref. Fig. 010)

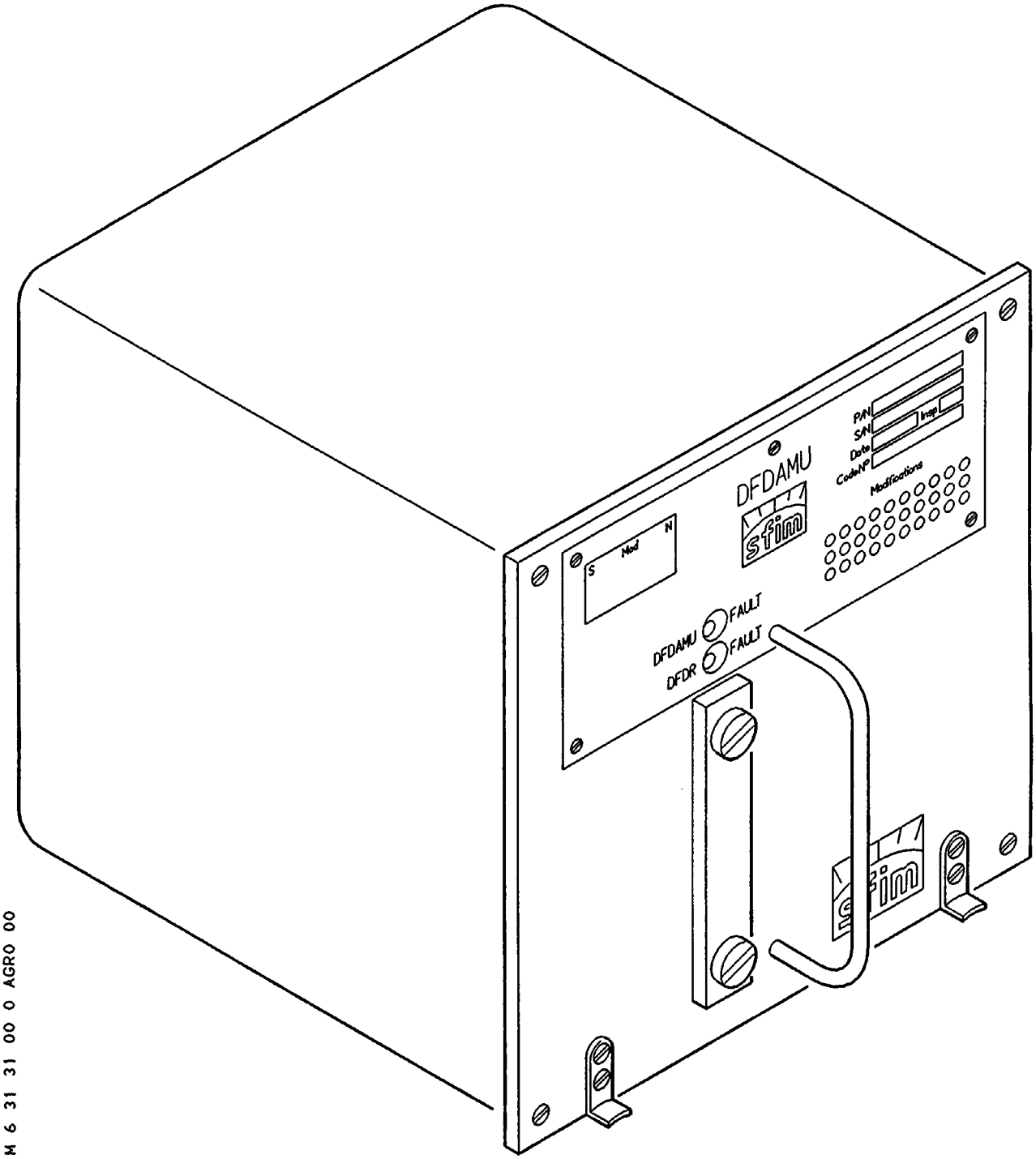
R **ON A/C 001-100,

R (2)Solid State Flight Data Recorder (SSFDR)
R The SSFDR is in compliance with ARINC 717 and has the capability to store
R the last 50 hours of data which are collected by the DFDAMU. The SSFDR
R functional block diagram illustrates the internal interconnection of the
R functional modules of the SSFDR.
R (a)Interface
R The data input is connected to the DFDAMU. The format on this line is
R HARVARD BIPHASE code with 768 bits per second (= 64 words/sec.). An
R output for playback data is provided with the same data rate, code and



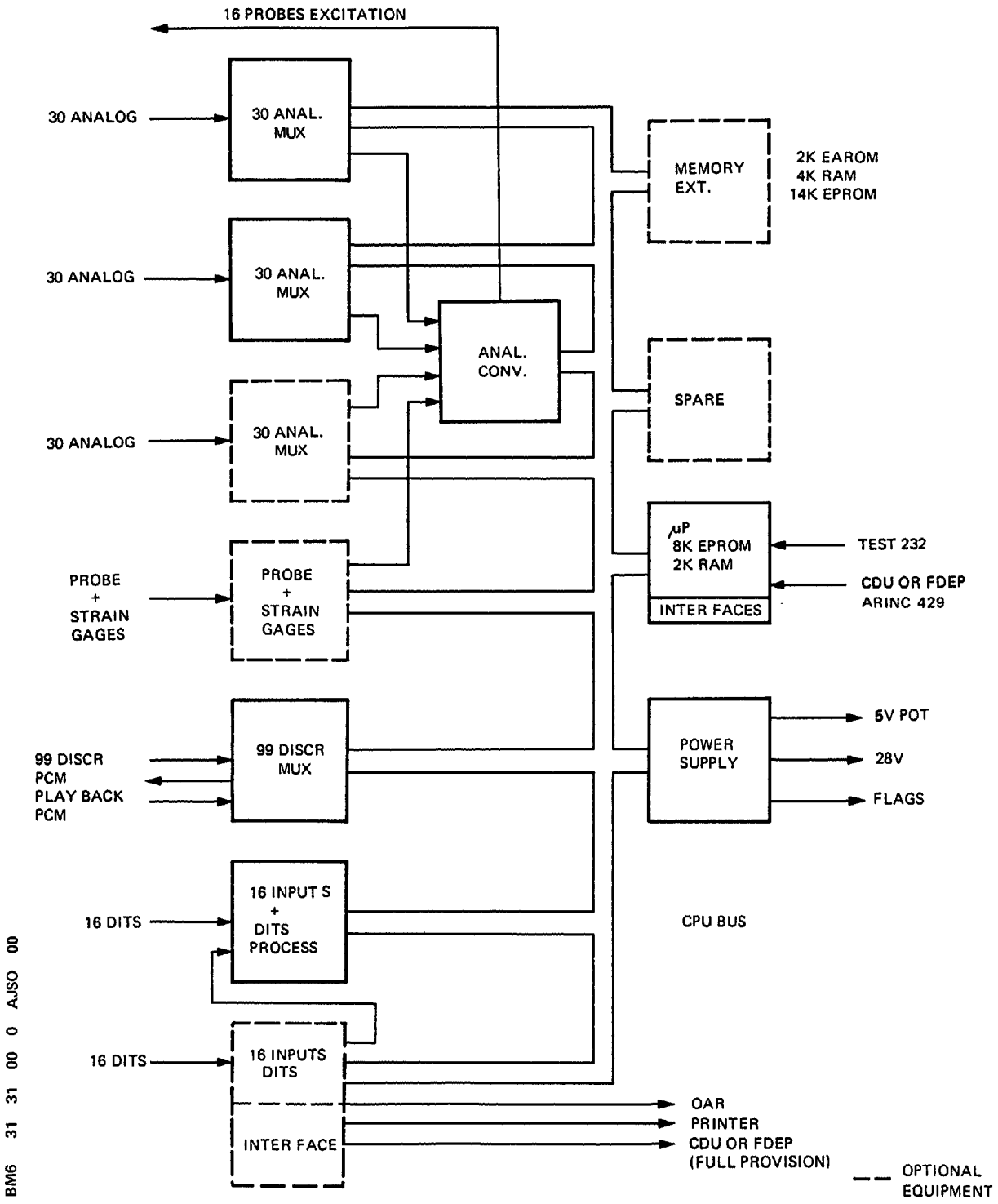
BM6 3131000AGQO 10

AIDS DFDAU
Figure 005

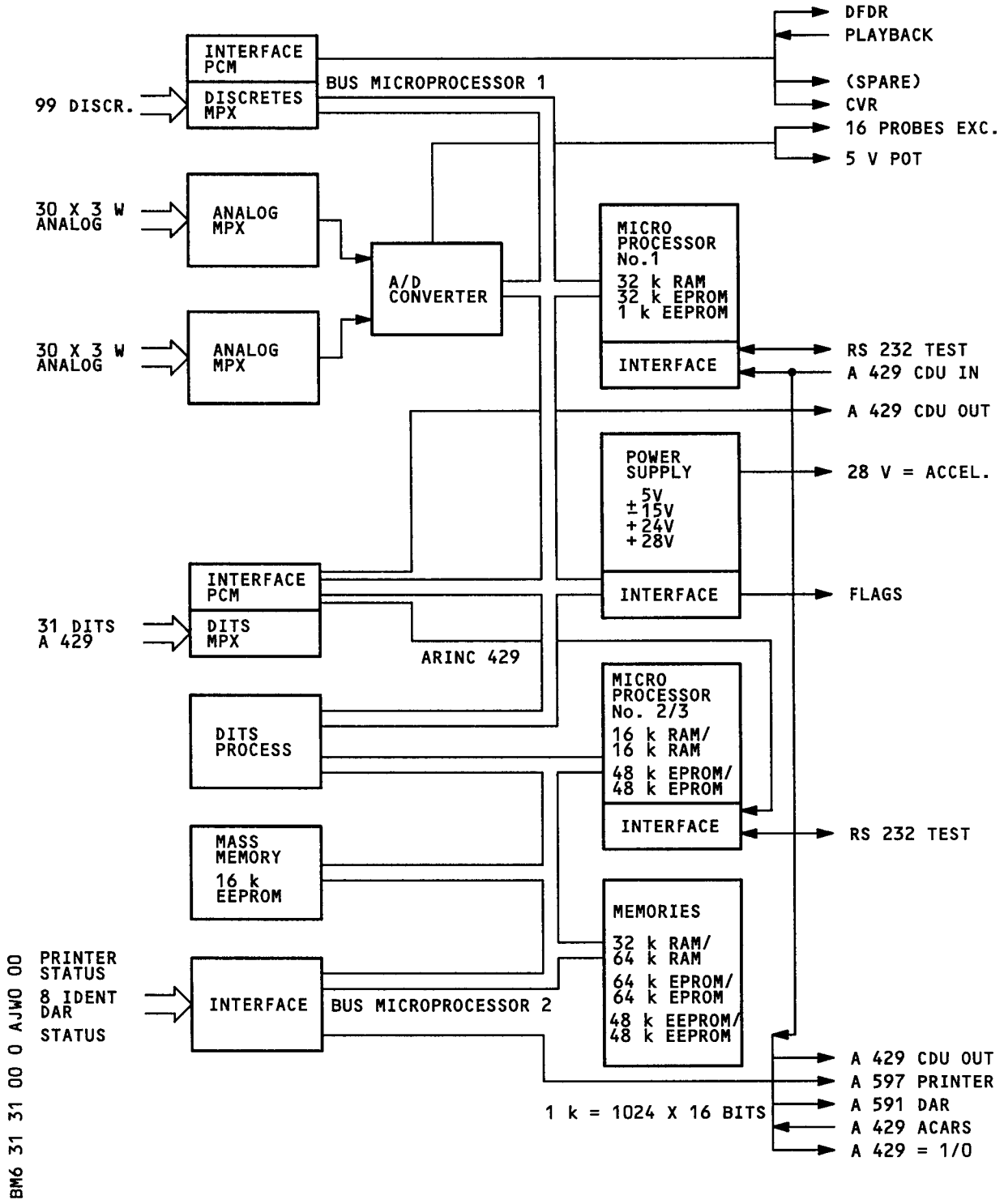


B M 6 31 31 00 0 AGRO 00

AIDS DFDAU
Figure 006



DFDAU Block Diagram
Figure 007



DFDAU Block Diagram
Figure 008

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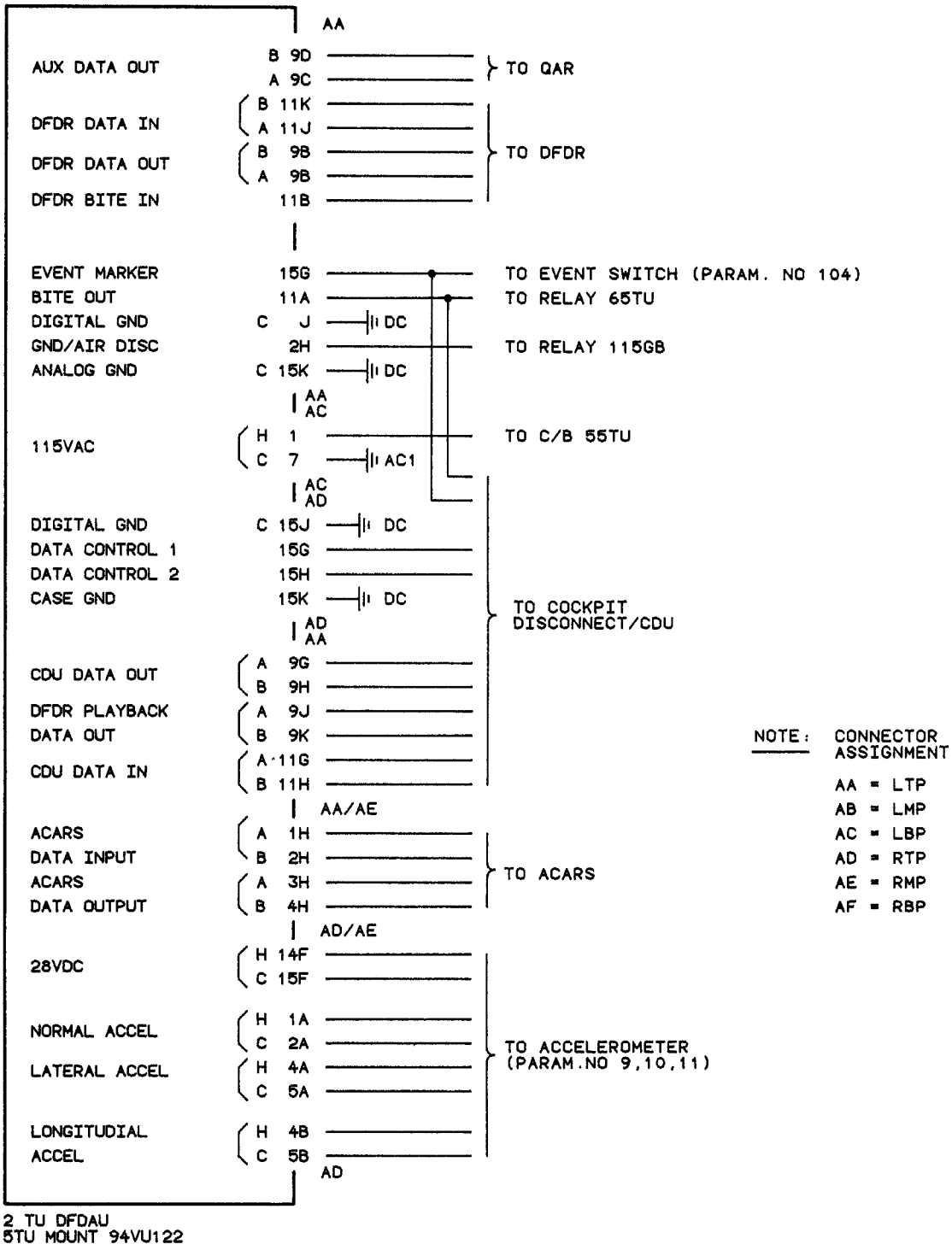
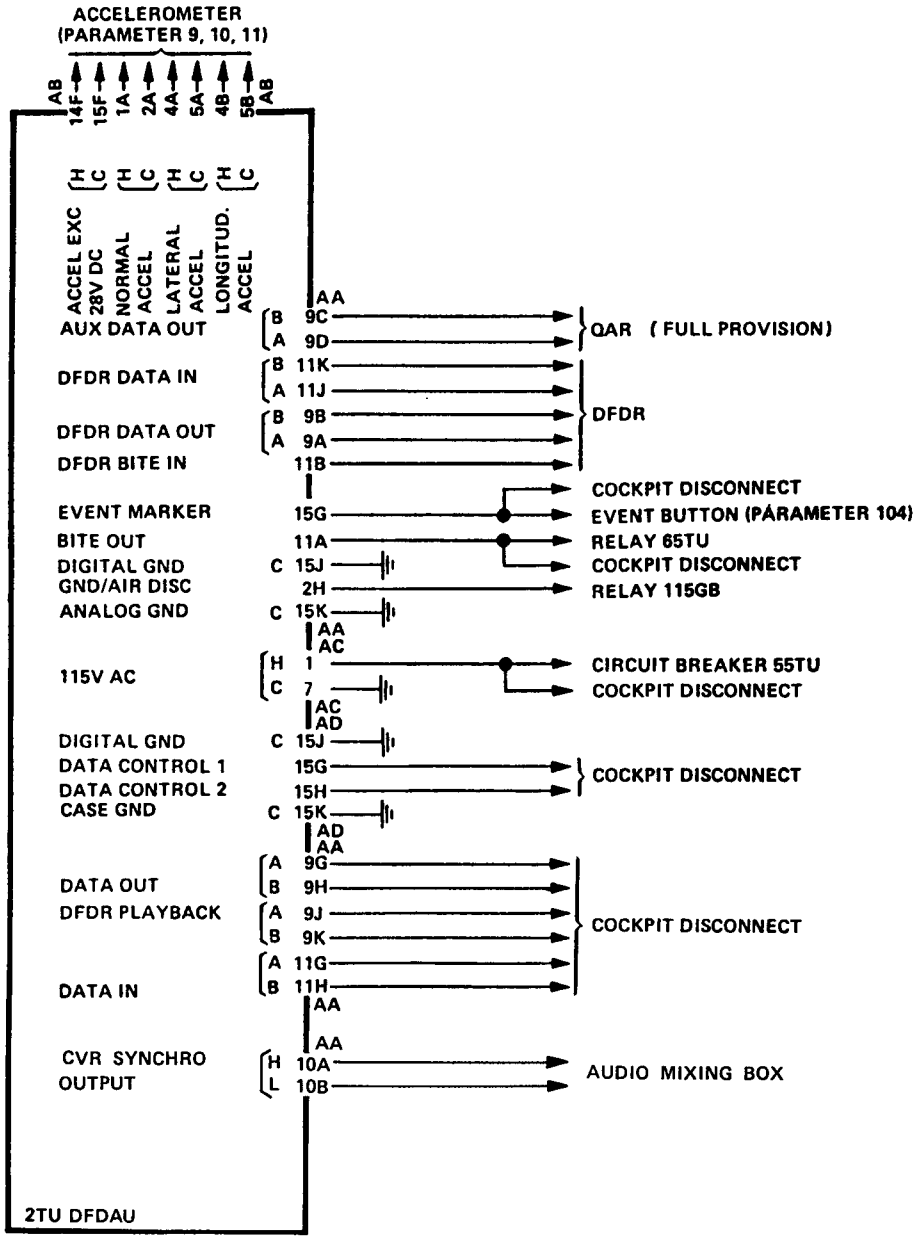


B M 6 31 31 00 0 ALK0-23

DFDAU System Internal Interface
Figure 009



BM6 31 31 00 0 ALE0 00

DFDAU System Internal Interface
Figure 010

R content as the input data stream. Status signals indicate the condition
R of the recorder.
R (b)Functions
R The data is stored in the Crash Survivable Memory Unit (CSMU) which
R contains solid-state flash memory devices. The recorder receives a
R 64 words/sec. data stream from the Digital Flight Data Management and
R Acquisition Unit (DFDAMU). The incoming data is recorded as it is re-
R ceived and is not aligned or processed in any way. No data compression
R is necessary to store the entire 50 hours of flight data in the CSMU.
R The continuous playback data is transmitted via the playback output to
R the DFDAMU to allow a closed loop check. In addition a Built-In-Test-
R Equipment (BITE) monitors the correct operation of the SSFDR. In case
R of a failure the SSFDR status signal drives the CTL PNL indicator. The
R SSFDR BITE signal is connected to the DFDAMU.
R (c)Fast playback
R For downloading the stored SSFDR data a Download (DLU) is available.
R The DLU is a PC based device, that houses the software necessary to
R download the contents of CSMU and to monitor the data parameters.
R To extract the recorded data without removing the SSFDR from the air-
R craft, or to monitor the real-time parameters as they are recorded, a
R portable computer is required.
R The SSFDR is capable of downloading the entire 50 hours of stored data
R within 20 minutes. The actual transmission time is PC dependant.
R (d)ULB
R An Underwater Locator Beacon (ULB) is directly attached to the front
R panel of the recorder. The beacon actuates upon immersion in either
R fresh or salt water of any depth to 6000 meters and has a detection
R range of 1800 to 3600 meters. The beacon emits an acoustic signal of
R 37.5 kHz during a pulse length of 10 msec and at a pulse repetition
R rate of 1 pulse per second. The ULB is serviceable without disassembly
R of the recorder. Maintenance has to be performed in determined time
R intervals to replace the battery for the ULB.
R (Ref. Fig. 011)
R (Ref. Fig. 012) *
R (Ref. Fig. 013)

(3)Linear Accelerometer (LA)

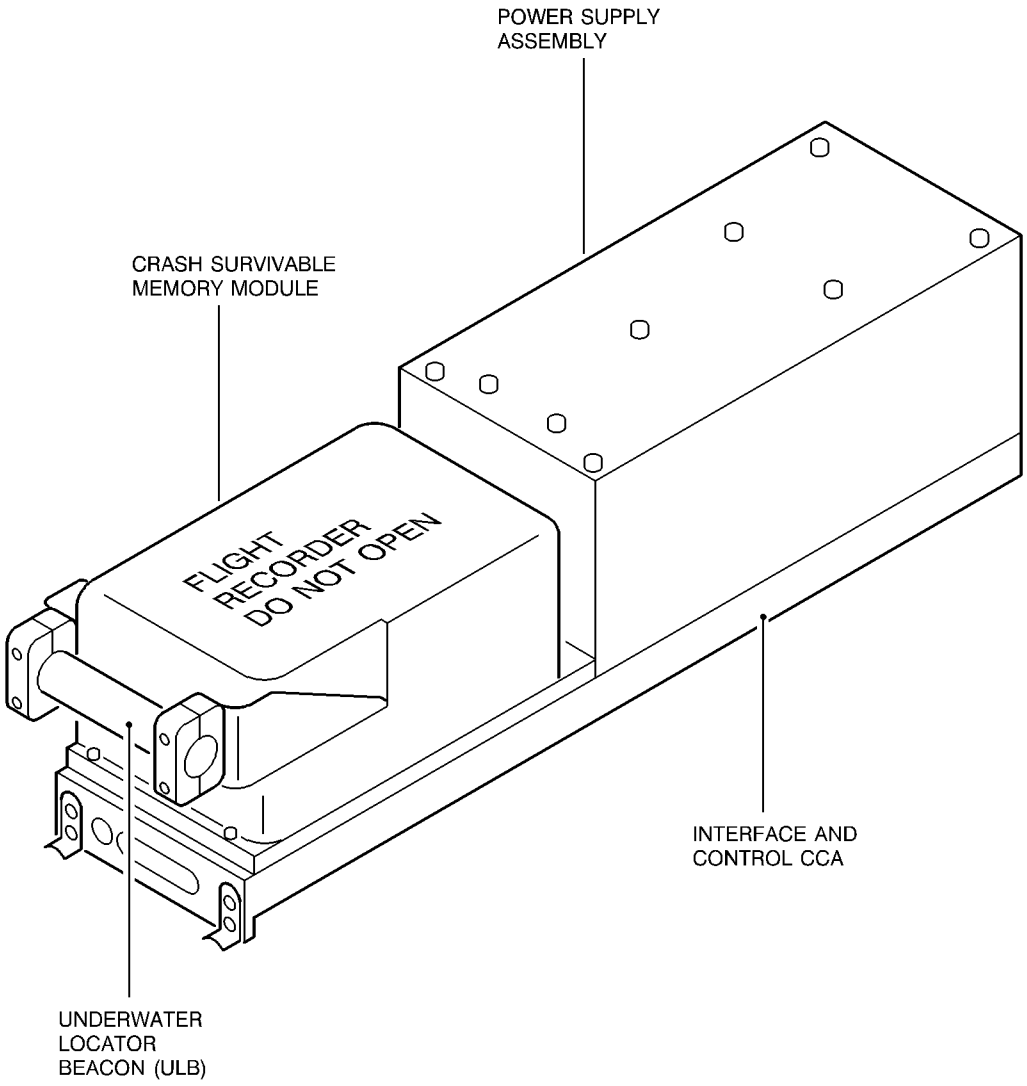
The force produced by an acceleration displaces a pendulum in the sensing mechanism. The displacement is sensed by a proximeter which generates a signal proportional in amplitude to the displacement. The signal is amplified by a servo-amplifier to excite a torque coil mounted on the pendulum. The current flowing through the torque coil produces a force directly proportional to the acceleration force.

The voltage drop across a load resistor, connected in series with the torque coil, is an accurate electrical analog of the acceleration and provides the input signal to the DFDAU.

The null output signal is raised by a required amount by the null offset circuit. At null the lateral and longitudinal axis output signal is 2.6V DC and the vertical output signal is 1.8V DC.

Range of measurement:

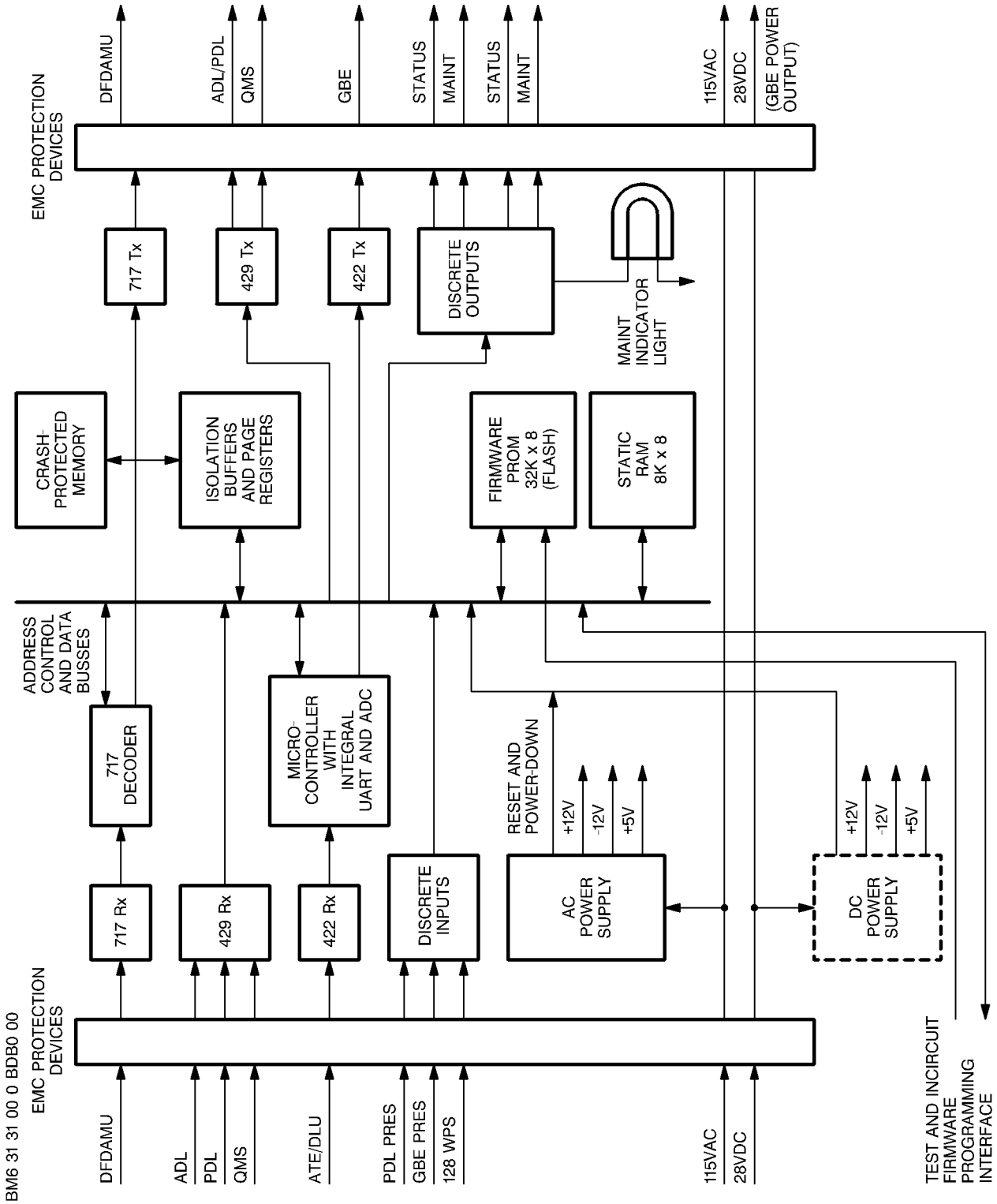
- Vertical axis (z) = -3g to +6g
- Longitudinal axis (x) = 1g



BM6 31 31 00 0 BDA0 00

R

AIDS SSFDR
Figure 011



SSFDR Block Diagram
Figure 012

R

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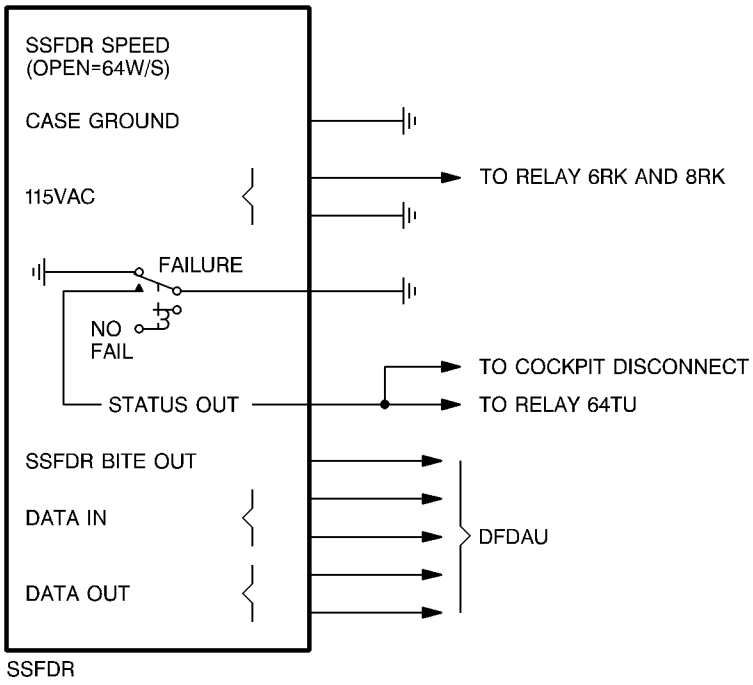


BM6 31 31 00 0 BDC0 00

R

SSFDR System Internal Interface
Figure 013

- Lateral axis (y) = 1g

The output signal in terms of output volts per applied acceleration is shown in the detailed description of parameter no. 9, 10 and 11. The accelerometer is supplied by the DFDAU with 28V DC.

The functional block diagram illustrates the structure on one LA single axis.

(Ref. Fig. 014, 015)

(4)Quick Access Recorder (QAR)

The purpose of the QAR is to store serial data (equivalent to the DFDR data) on a cassette for on ground performance, maintenance or condition monitoring tasks.

The installed QAR is capable to store data on a quickly accessible magnetic tape cassette. The quick access to the cassette is performed by a door, incorporated in the front panel of the QAR. Two indicator lamps are located on the front panel behind the access door for checking the status of the recorder.

Data is recorded on 4 tracks on the cassette. The tracks are switched automatically by BOT/EOT detection. Continuous recording is controlled through power interlock simultaneously to DFDR energization. Data is transmitted from DFDAU in RZ bipolar code with 128 words per second, 12 bit each.

The QAR complies with ARINC 591 and is connected to the auxiliary QAR output to the DFDAU. The QAR status signals are connected to CTL PNL for indication of QAR FAIL and QAR TAPE LOW. The TAPE LOW indicator illuminates when the tape has advanced to the last track.

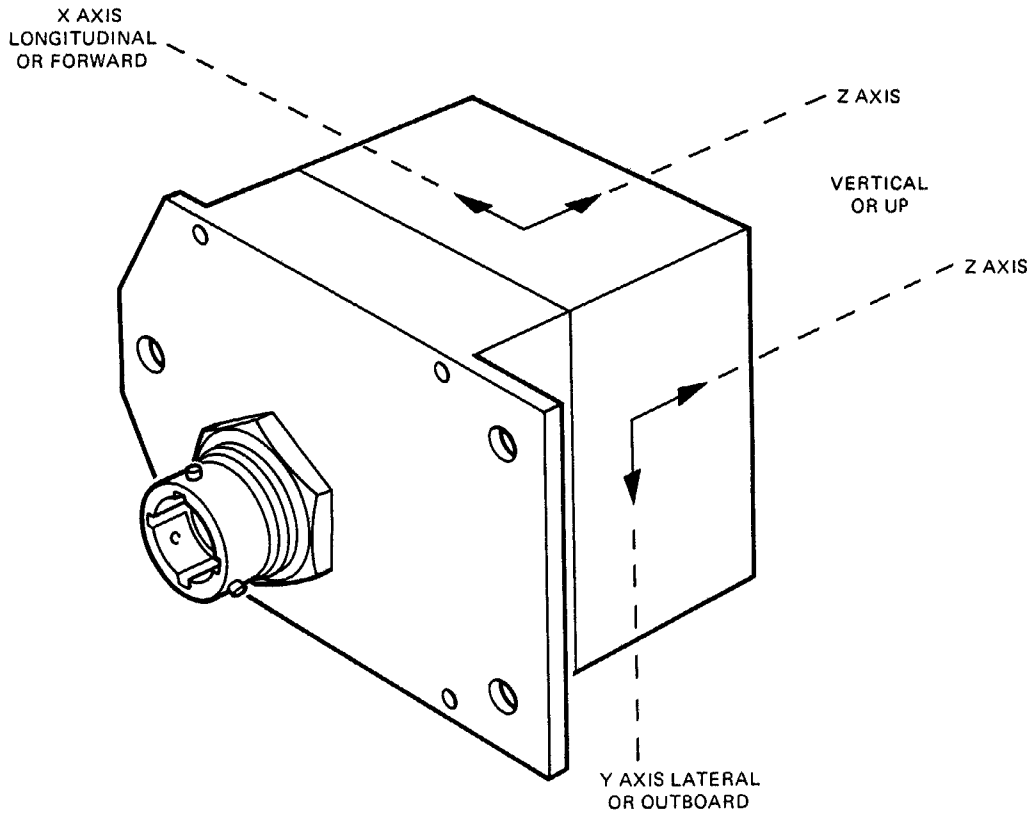
(a)QAR Functions

The selected Bipolar RZ Interface receives serial digital data from the DFDAU. This signal is adapted by the write function of the write and control logic module. A rotary stepper switch selects the respective track and record head.

The track switching is controlled by the track select logic considering the BOT/EOT detection and the automatic track reset after removing the cassette. The selected track number is stored by magnetic latching relays. The track select logic also controls the tape low output signal.

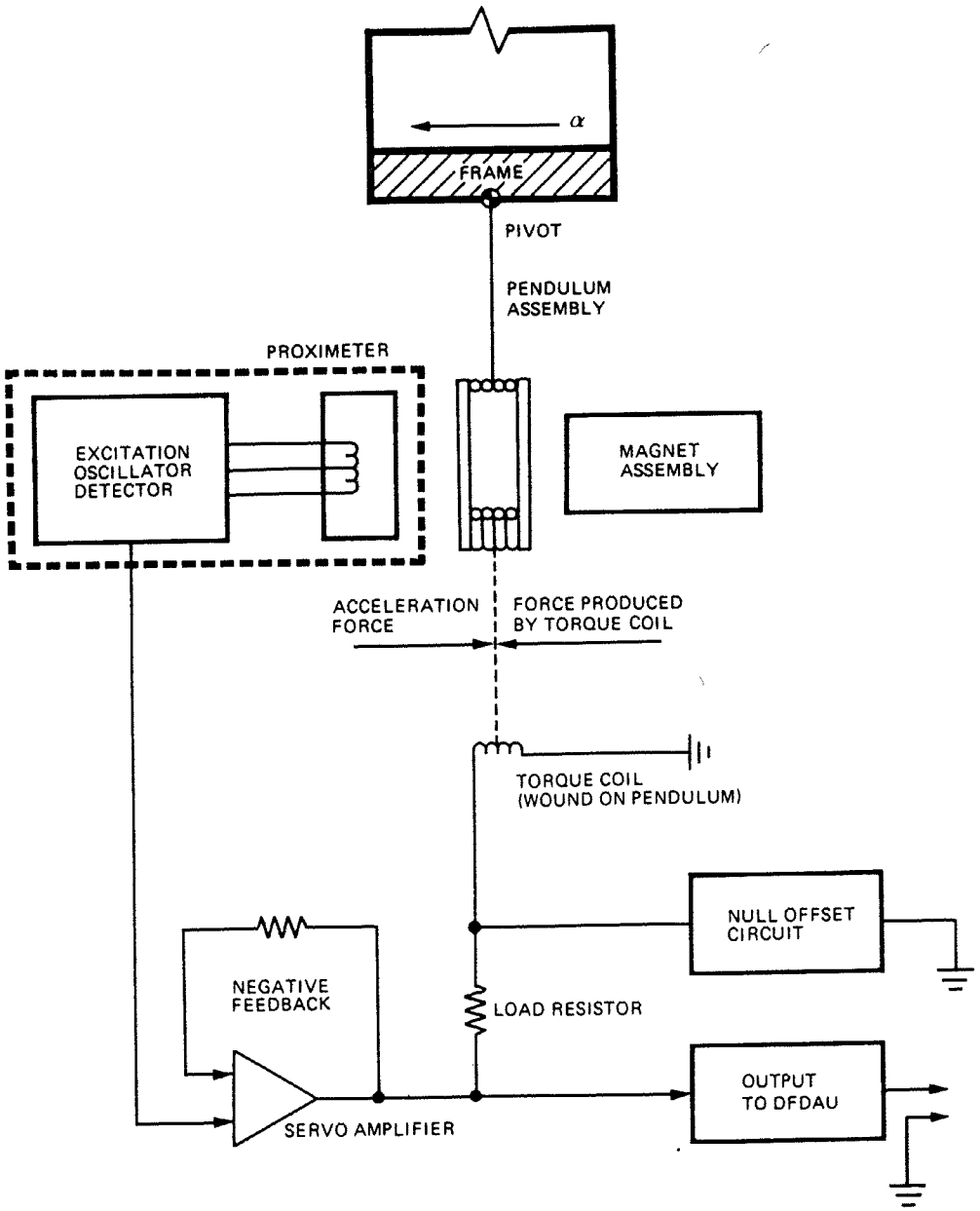
The Drive and Control Board controls the speed and direction of the tape motion. Constant motor speed is maintained by a optical tachometer mounted on the drive motor assembly and a speed (frequency) sensitive feedback loop. The tape transport motor drive depends on the run command input signal, the speed program input signal and the forward/reverse command from the track select logic.

A BITE logic monitors the reel rotation, the tape motion and the Cyclic Redundancy Check Character (CRCC). In case of discrepancies the QAR light on the control panel (CP) is activated.



BM6 31 31 000 CAMO

AIDS LA
Figure 014



BM6 31 31 000 CCMO

LA Block Diagram
Figure 015

(b)Change of the Cassette
The operational procedure to change the cassette is as follows:
- turn the handle and open recorder door
- press the **EJECT** pushbutton; the cassette will be electromechanical released
- change cassette
- extract cassette
- insert new cassette in its aperture until the **READY** indicator illuminates
- lock cassette and close recorder door.

(c)Indicators
FAULT
The **FAULT** indicator is illuminated when:
- no tape motion with record command on
- no record head current, input data present and record command on
- **CRC** character indicates a failure
- and of track 4 reached

TAPE LOW
The tape low warning is switched on at the third track change.

**ON A/C 004-100,

(Ref. Fig. 016)

**ON A/C 001-003,

(Ref. Fig. 017)

**ON A/C 004-100,

(Ref. Fig. 018)

**ON A/C 001-003,

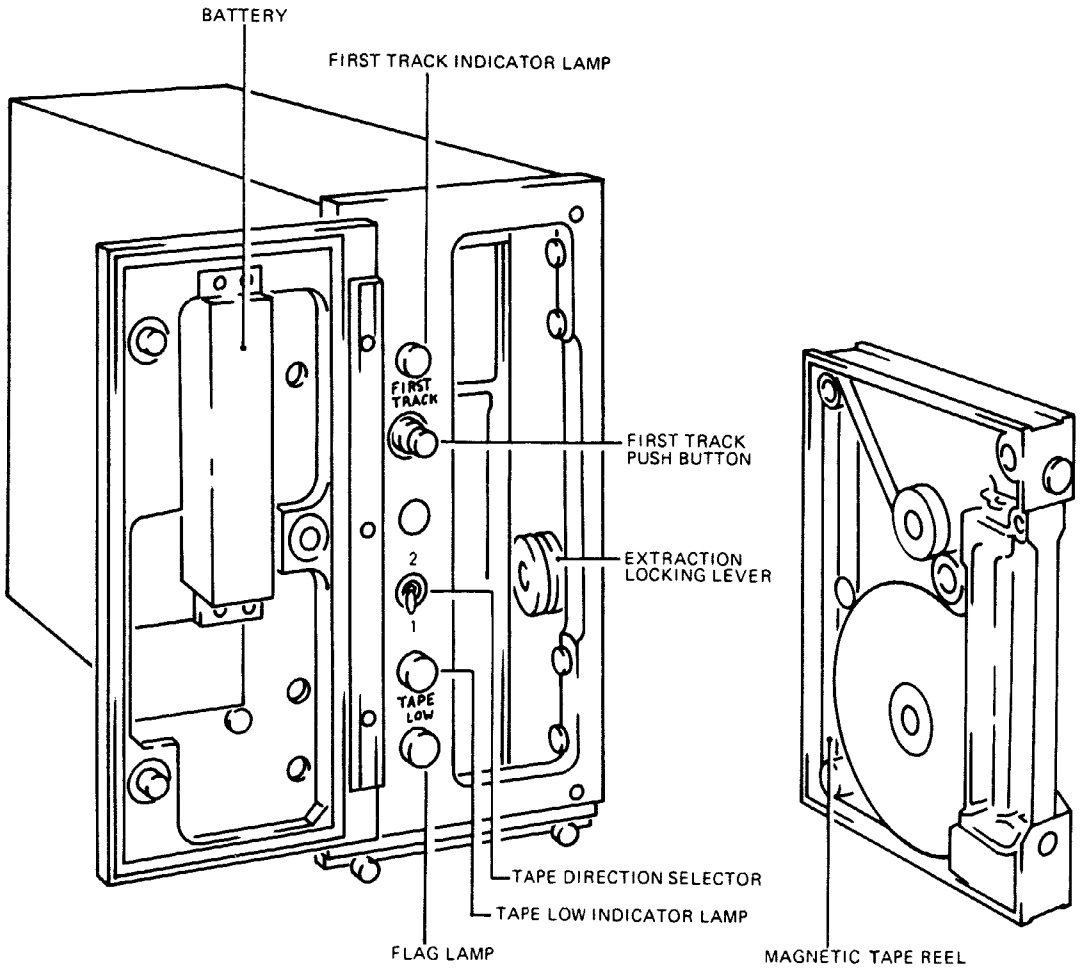
(Ref. Fig. 019)

R **ON A/C 001-100,

(Ref. Fig. 020)

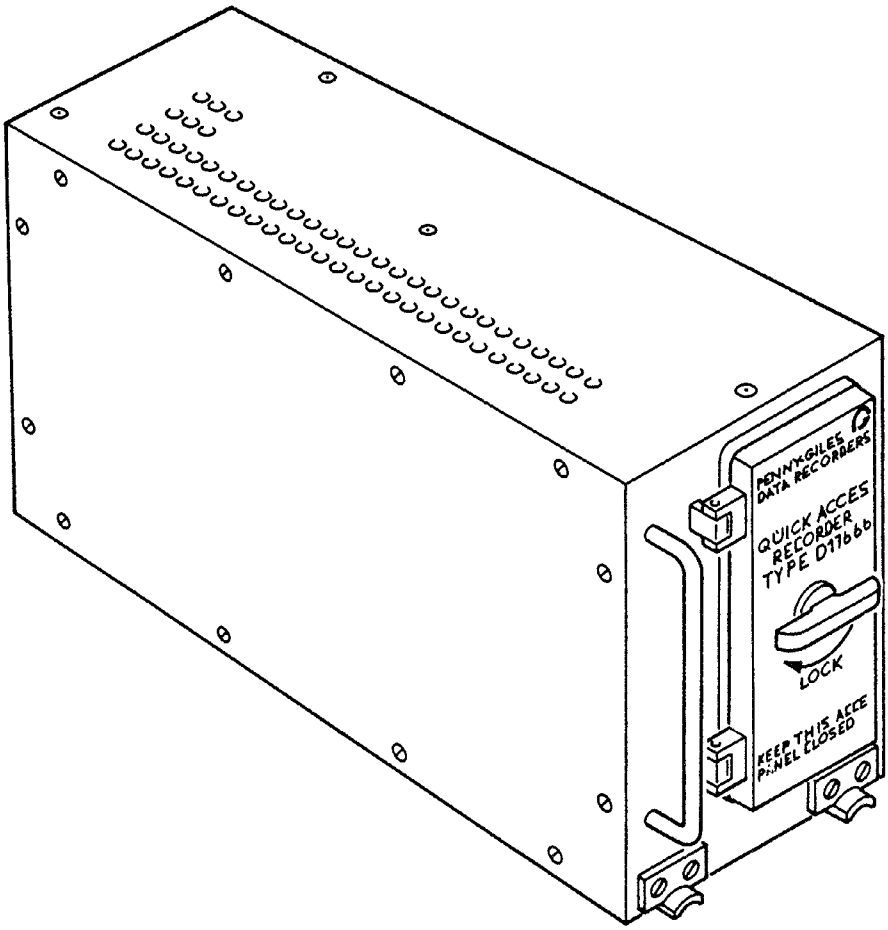
4. System Operation

A. Energization
With the oil pressurization of one or both engines, the power interlock is
R released for supply of the **SSFDR** with 115 V/400 Hz. The **DFDAU** is connected directly to the busbar.
The **QAR** is supplied directly from the busbar and the **QAR** run control is switched by the power interlock.
For maintenance and test purposes on ground as well as for preflight checks
R an override function is provided to supply the **SSFDR** and to run the **QAR**.



BM6 31 31 000 CZM O

AIDS QAR
Figure 016



BM6 31310 0 CLP 0-14

AIDS QAR
Figure 017

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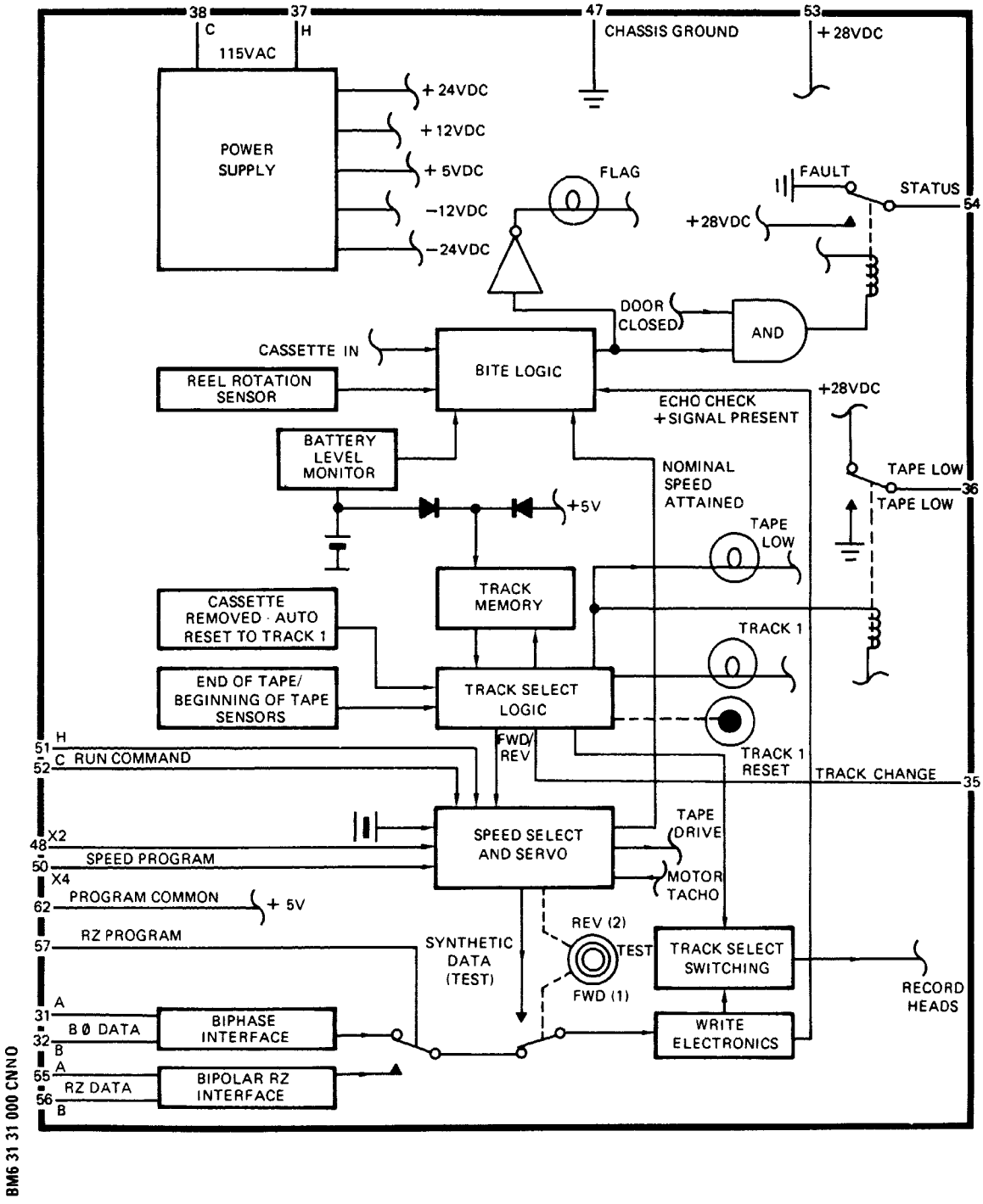
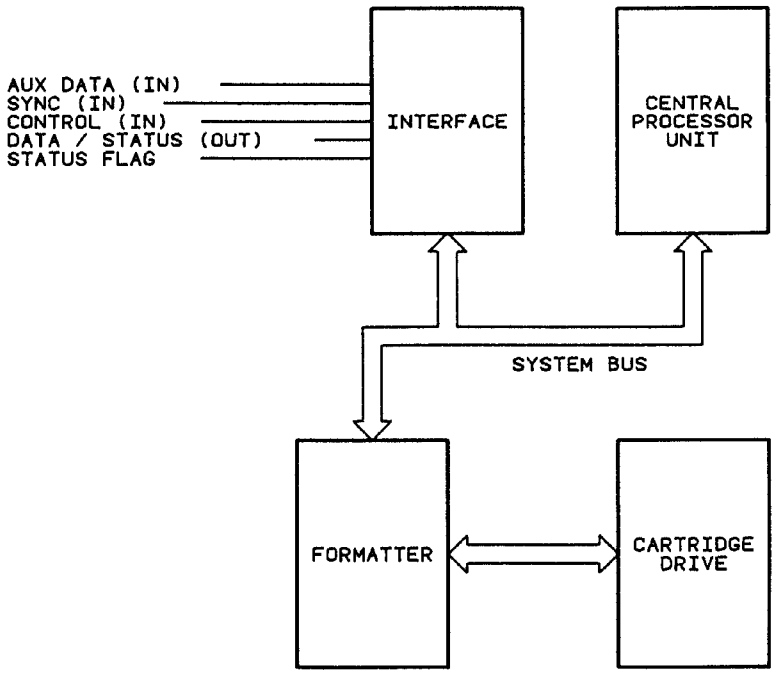
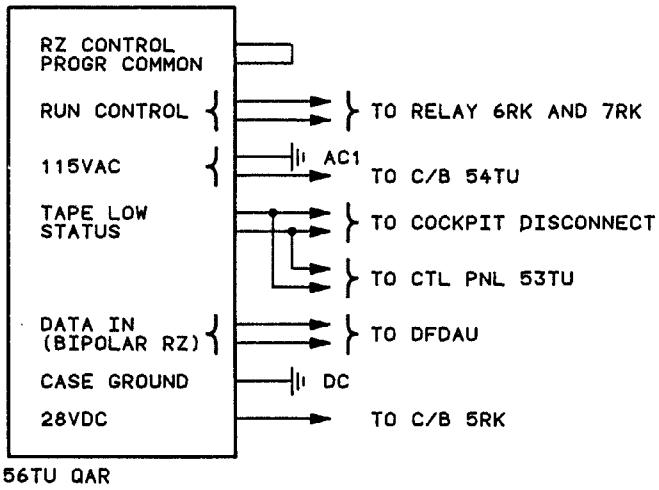


QAR Block Diagram
Figure 018



B M 6 31 31 00 0 CNS0 00

QAR Block Diagram
Figure 019



B M 6 31 31 00 0 EAT0-28

QAR System Internal Interface
Figure 020

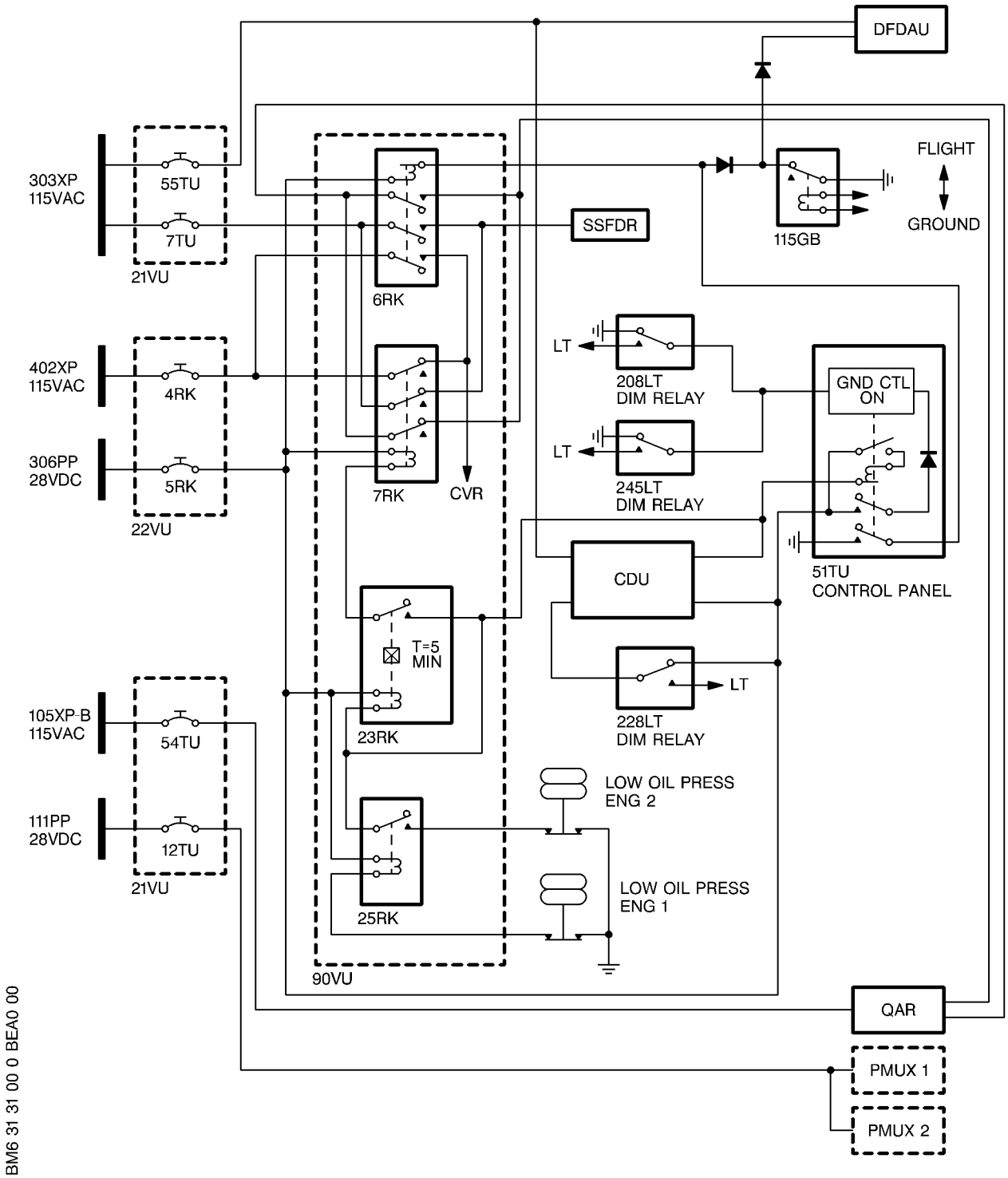
For maintenance and test purpose on ground as well as for preflight checks
R there is an override function to supply the SSFDR.
When the GND/CTL button on the CTL PNL is pressed, the override function is held by a magnetic latch and the ON button comes on blue. The equipment will be supplied through this override function until the GND/CTL button is pressed again or the automatic power interlock is active.
R (Ref. Fig. 021)

B. Control
(1)Override of Power Interlock
With the magnetically latched GND/CTL button, it is possible to override the power interlock. In this manner, the system is ready for preflight checks or for maintenance and test purposes.
The power interlock override function should not be unnecessarily activated, to avoid erasure of stored data.
(2)EVENT Button
An EVENT button is installed on the pedestal to record an EVENT MARK (see parameter no. 104) on the DFDR.
(Ref. Fig. 022)
(Ref. Fig. 023)

C. Indication
When the GND/CTL button on the control panel is pressed the override function is held by a magnetic latch and the ON button comes on blue.
R The status of the DFDAU and SSFDR is shown by the DFDAU/DFDR indicator located on the control panel. In case of a DFDAU failure, the indicator DFDAU comes on yellow. This indicator is activated by the DFDAU BITE
R output. In case of a SSFDR failure the indicator DFDR comes on yellow except when the DFDAU indicator is also activated. This indicator is ini-
R tiated by the SSFDR status output.
R The status signals of SSFDR and DFDAU are suppressed by a relay, activated by the nose gear shock absorber, during flight.
The status of the QAR and QAR tape is annunciated on the CTL PNL by the 'QAR FAIL' or 'QAR' and 'QAR T/LOW' or 'TAPE' indicators.
R The DFDAU and SSFDR statuses are also indicated on the front side of the
R DFDAU by two indicators (indicator FDAU- and DFDR FAULT).

D. Lighting
The control panel is integrally illuminated. The illumination can be gradually dimmed by turning OVERHEAD PANEL LIGHT dim knob.

E. Monitoring
(1)Test
The operation of the power interlock and status monitoring can be tested by activating the 'manual ON' function. If no engine is running and GND/CTL is not pressed, the status lights of DFDR and QAR must be on.
The pressed and magnetically latched GND/CTL button activates the power
R interlock by which the SSFDR is energized. Correct functioning of the unit is indicated when DFDR status light is off. Because the DFDAU is supplied continuously, the status light of the DFDAU must be off.
To check correct functioning of the system, the monitoring function in



BM6 31 31 00 0 BEA0 00

AIDS Power Interlock
Figure 021

R

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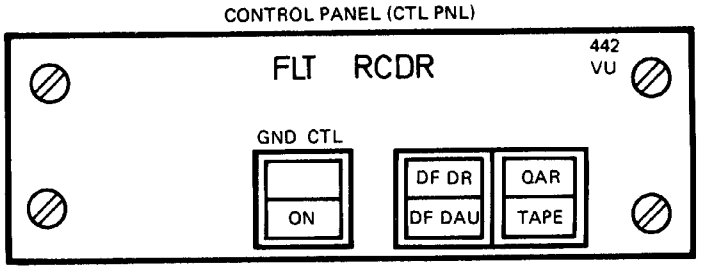
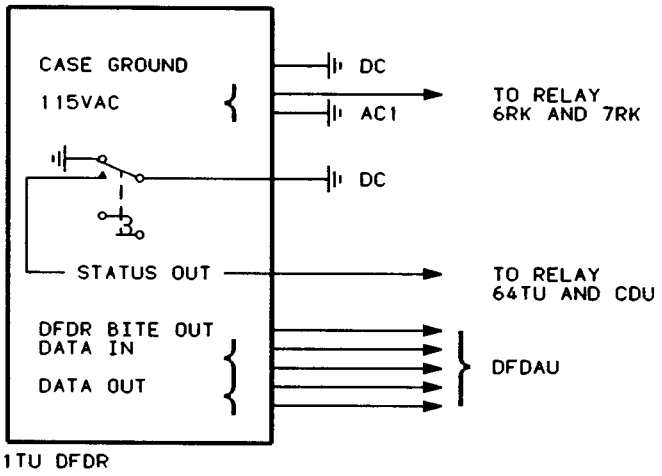


Control Panel
Figure 022

B M 6 31 31 00 0 ANP0



B M 6 31 31 00 0 CTSO 01

EVENT Button
Figure 023

each unit (BITE) is continuously active.

R For test purposes a line test connector is located on the DFDAU and SSFDR front side. With a separate test set, the internal functions of DFDAU and

R SSFDR can be checked.

(a) QAR Operational Test

Insert a fresh cassette. Do not close the recorder door. Hold the toggle switch in the '1' position for about 3 seconds. The red FLAG lamp goes out.

Now move this switch to the '2' position. The FLAG lamp goes out and comes again after about 3 seconds. Release the toggle switch and close the recorder door. The recorder is in operational condition.

If the FLAG lamp fails to go out for either position of the '1 - 2' toggle switch, this indicates recorder fault.

(2)Monitoring

R The DFDAU and SSFDR as well as QAR and PRTR are permanently monitored by the BITE of each unit under microprocessor control or respective circuitry. The following items are monitored:

DFDAU

- operation of the microprocessor
- operation of the memories
- operation of the input/output functions
- operation of the DFDR playback signal
- operation of power supply circuitry

R SSFDR

R - operation of tthe microprocessor

R - operation of the memories

R - operation of input/output functions

R - operation of recorded data

R - operation of power supply circuitry

QAR

- operation of tape motion
- operation of cassette tape low
- operation of power supply circuitry

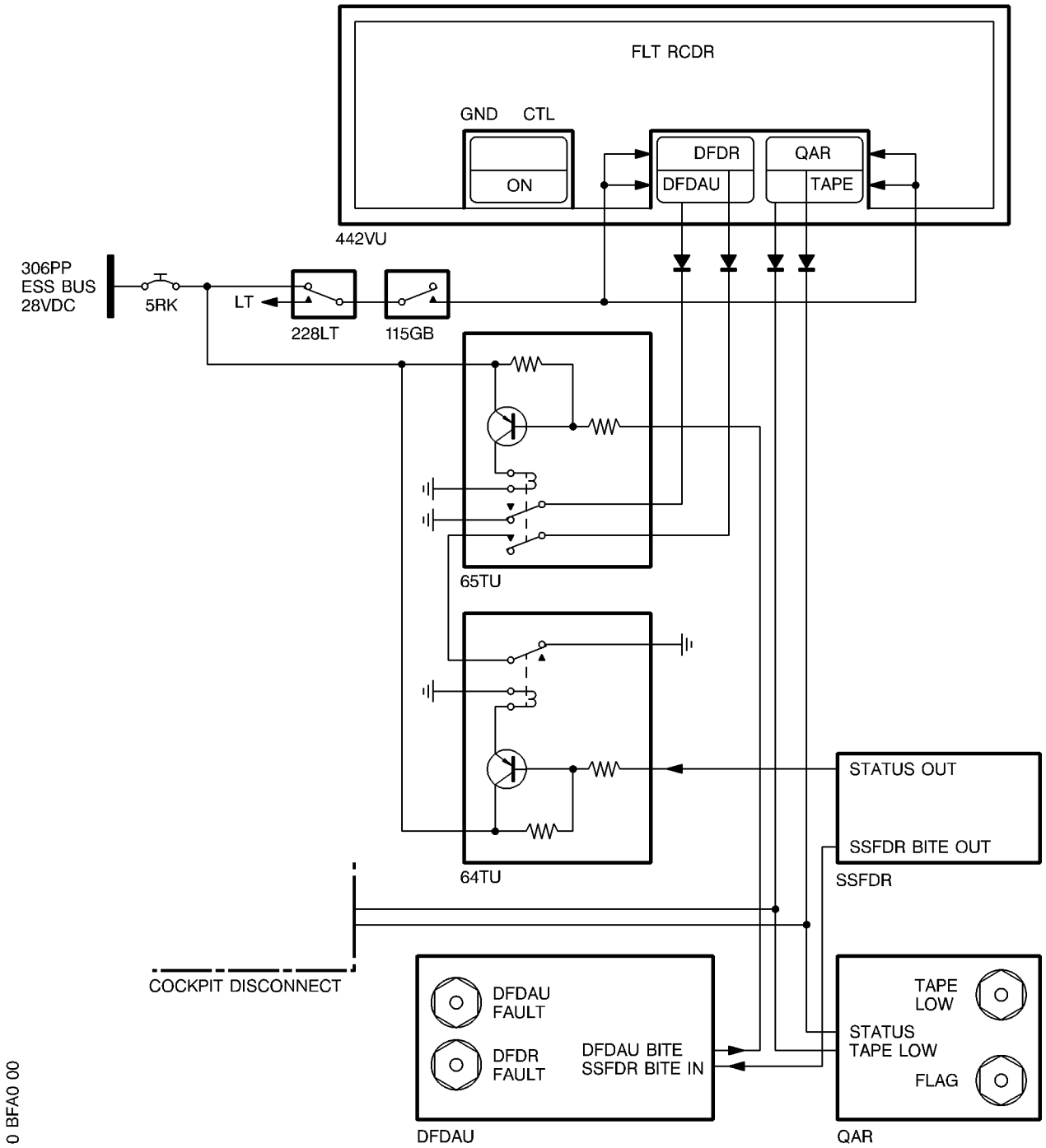
When a failure is detected, the monitoring system illuminates the respective indication lights on the CTL PNL or on the CDU. Each unit also illuminates the respective fail light on its front side with the exception of the DFDR fail light which is located on the front side of the DFDAU.

R **ON A/C 004-100,

R (Ref. Fig. 024)

R **ON A/C 001-003,

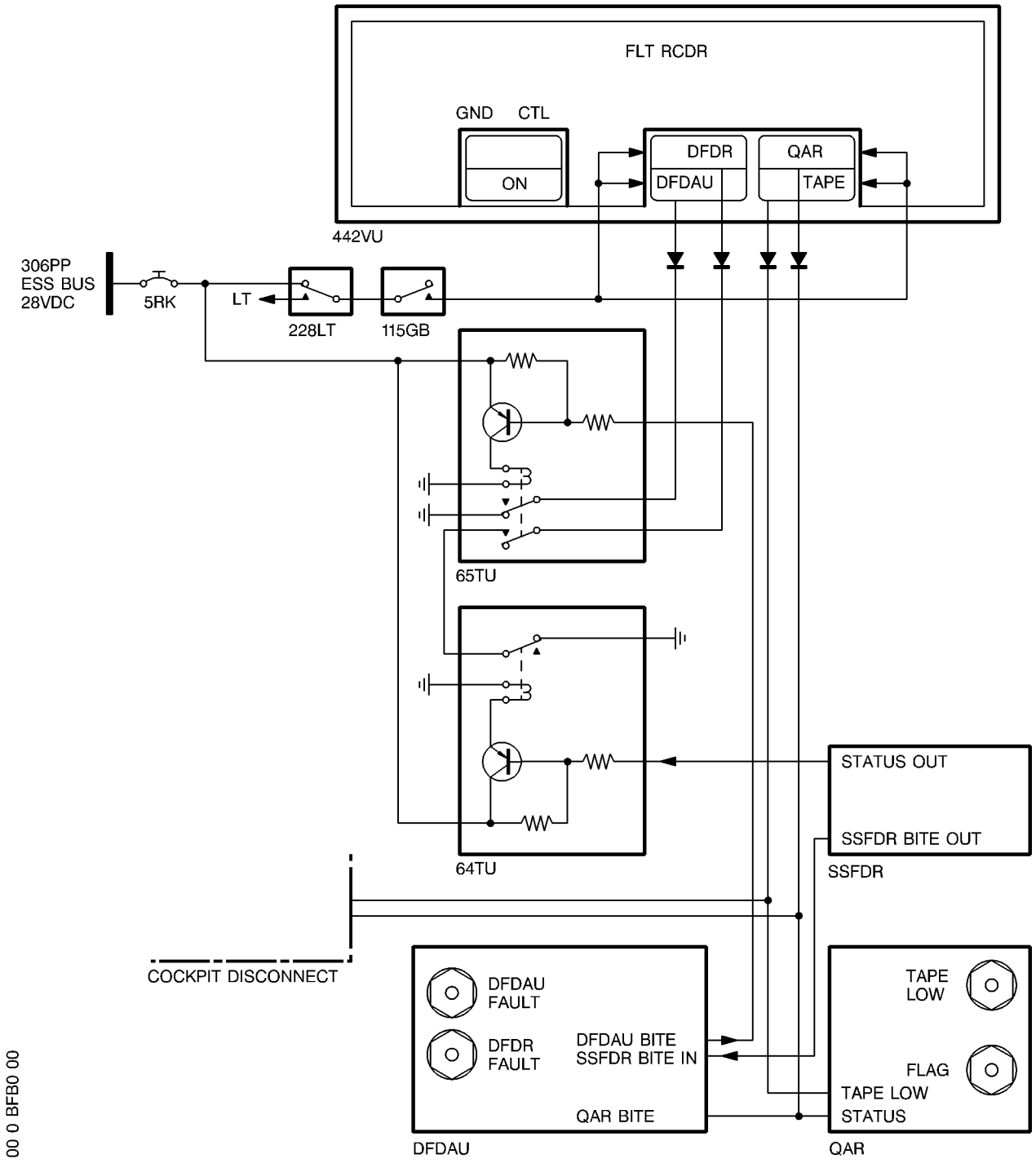
R (Ref. Fig. 025)



BM6 31 31 00 0 BFA0 00

AIDS Fault Monitoring
Figure 024

R



BM6 31 31 00 0 BFB0 00

R

AIDS Fault Monitoring
Figure 025

1. Operational Test

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
(2)	Portable Copy Recorder

Referenced Procedures

- 21-21-00, P. Block 501	Flight Compartment and Electronic Racks	D
	Air Distribution	D
- 24-41-00, P. Block 301	AC External Power Control	D

B. Job Set-Up

(1)Connect electrical ground power unit and energize electrical network (Ref. 24-41-00, P. Block 301).

(2)Make certain that the flight compartment and electronic rack air distribution system is working (Ref. 21-21-00, P. Block 501).

(3)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/DFDR	7TU	E2
21VU	AIDS/PMUX	12TU	E5
21VU	AIDS/QAR	54TU	E4
21VU	AIDS/DFDAU	55TU	E3
22VU	RCDR/CTL	5RK	F27
133VU	LDG GEAR PROX DET & RELAYS - SYS 1/RELAYS & RETRACT/CTL	2GB	U51

**ON A/C 001-104,

Post SB 31-2116 For A/C 101-104,

(4)For the Readout Procedure of Digital Flight Data Recorder:

(a)Put a warning notice in the cockpit in position to tell persons not to operate the flight controls.

(b)Position access platform at bulk cargo compartment door (Zone 813).

(c)Open bulk cargo compartment door (Zone 813).

**ON A/C ALL

C. Test

(1)Power Interlock Circuit Test

ACTION	RESULT
1. On panel 133VU: On panel 442VU: - open circuit breaker 2GB to simulate A/C flight position.	- indicator light DFDR goes off.
- close circuit breaker 2GB.	- indicator light DFDR comes on.
2. On panel 442VU: On panel 442VU: - press pushbutton switch GND CTL 51TU.	- blue indicator light GND CTL/ON comes on. - indicator light DFDR goes off.
- release pushbutton switch GND CTL 51TU.	- blue indicator light GND CTL/ON goes off. - indicator light DFDR comes on.
- press pushbutton switch GND CTL 51TU.	- blue indicator light GND CTL/ON comes on. - indicator light DFDR goes off.
3. On panel 22VU: On panel 442VU: - open circuit breaker 5RK.	- blue indicator light GND CTL/ON goes off.
- close circuit breaker 5RK.	- indicator light DFDR comes on after 5 min. ±10%.

(2)Control Panel Fault Light Logic Test

ACTION	RESULT
1. On panel 442VU: - press pushbutton switch GND CTL 51TU.	On panel 442VU: - blue indicator light GND CTL/ON comes on. - DFDR fault indicator light goes off.
2. On panel 21VU: - open circuit breaker 7TU.	On panel 442VU: - DFDR fault indicator light comes on.
- open circuit breaker 55TU.	- DFDR fault indicator light goes off. - DFDAU fault indicator light comes on.
- close circuit breaker 55TU.	- DFDAU fault indicator light goes off. - DFDR fault indicator light comes on.
- close circuit breaker 7TU.	- DFDR fault indicator light goes off.
3. On panel 442VU: - release pushbutton switch GND CTL 51TU.	- blue indicator light GND CTL/ON goes off.

ACTION	RESULT
	- DFDR fault indicator light comes on.

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

2. Readout Procedure of the Digital Flight Data Recorder

CAUTION : DO NOT REMOVE THE DISK OR ELECTRICAL POWER FROM THE PORTABLE INTERFACE DURING OPERATION.
IF YOU DO, YOU CAN CAUSE DAMAGE TO THE DATA ON THE DISK.

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

(Ref. Fig. 501)
(Ref. Fig. 502, 503)

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

NOTE : The user can find more information in the Portable Interface Operator's Manual P/N: 165E1630-00.

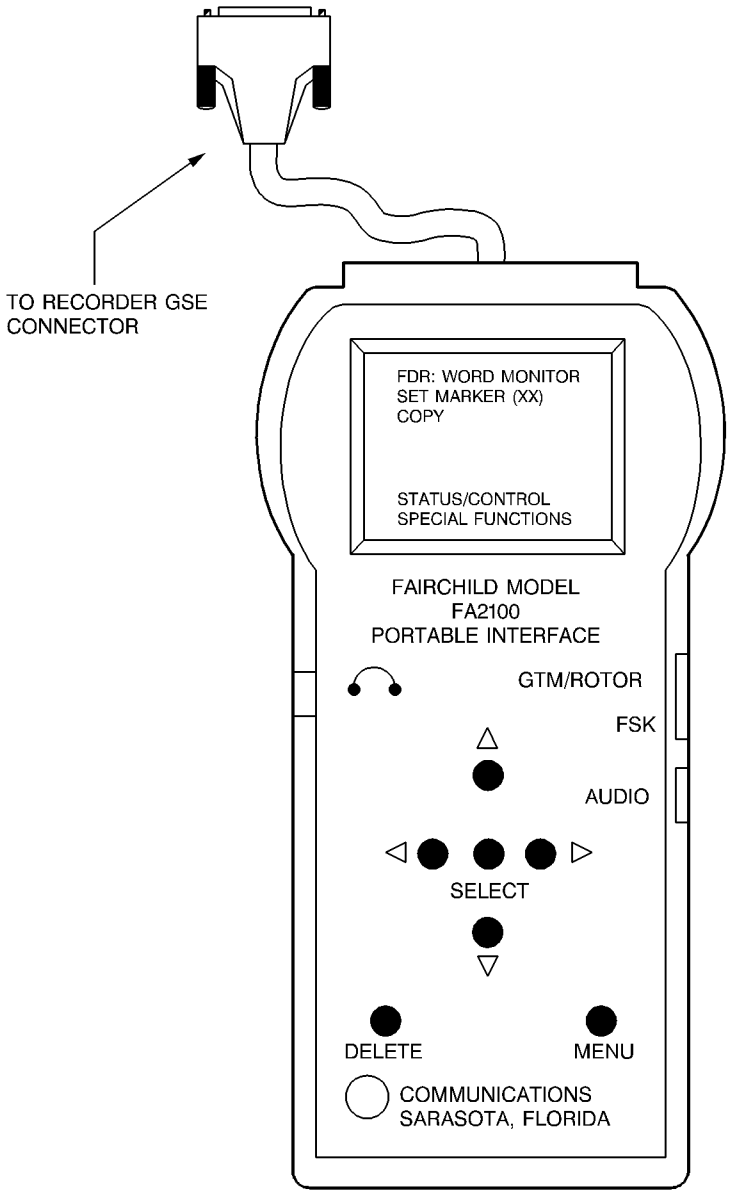
A. Equipment and Materials

ITEM	DESIGNATION
(1)	Access Platform, 3m (9 ft. 10 in.)
(2)17TES0043	Portable Interface (PI) FA2100GSE
(3)17TES0053	PC-Card Disk

B. Job Set-Up

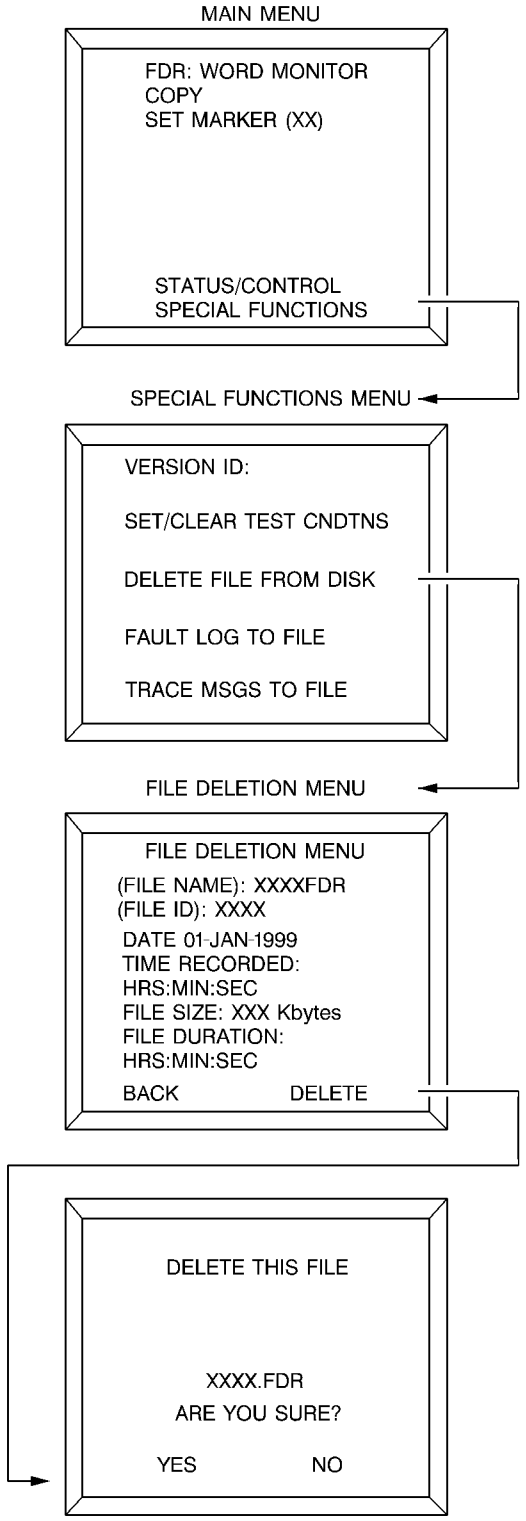
(1)For the Readout Procedure of Digital Flight Data Recorder:
(a)Put a warning notice in the cockpit in position to tell persons not to operate the flight controls.
(b)Position access platform at bulk cargo compartment door (Zone 813).
(c)Open bulk cargo compartment door (Zone 813).

**ON A/C 001-100,



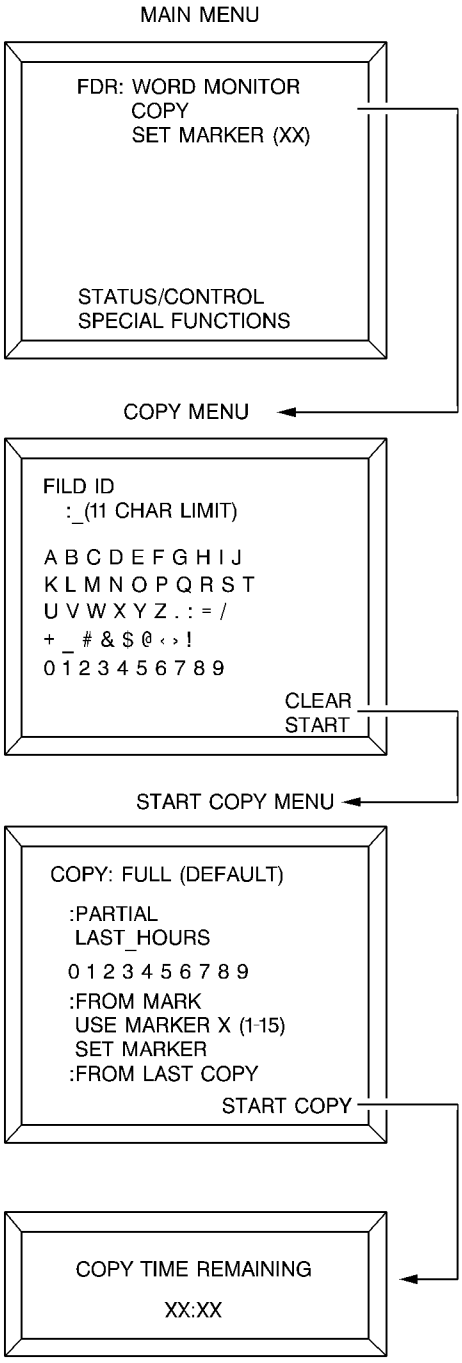
BM6 31 31 00 5 AGD0 00

Portable Interface (PI)
Figure 501



BM6 31 31 00 5 AHF0 00

Delete Files on the Card Disk
Figure 502



BM6 31 31 00 5 AHG0 00

Download Procedure of the DFDR Data
Figure 503

(3)Readout Procedure of the Digital Flight Data Recorder

NOTE : These Read Out Procedure with the Hand Held Download Unit (HHDLU) is in accordance with the Acceptance Test Unit (ATU).

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

(3)Readout Procedure of the Digital Flight Data Recorder

CAUTION : DO NOT REMOVE THE DISK OR ELECTRICAL POWER FROM THE PORTABLE INTERFACE DURING OPERATION.
IF YOU DO, YOU CAN CAUSE DAMAGE TO THE DATA ON THE DISK.

**ON A/C 001-100,

(Ref. Fig. 504)
(Ref. Fig. 505, 506)

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

(Ref. Fig. 507)
(Ref. Fig. 508, 509)

**ON A/C ALL

(3)Test of DFDR Tape Read Out for Acquisition of Mandatory Parameters
(a)Copying Process Procedure

ACTION	RESULT
1. On panel 133VU: - open circuit breaker 2GB to simulate A/C flight position.	On panel 442VU: - indicator light DFDR goes off.
- close circuit breaker 2GB.	- indicator light DFDR comes on.
2. On panel 442VU: - press pushbutton switch GND CTL 51TU.	On panel 442VU: - blue indicator light GND CTL/ON comes on.
3. On panel 21VU: - open circuit breaker 7TU.	On panel 442VU: - DFDR fault indicator light

ACTION	RESULT
	comes on.
4. On DFDR front plate: - remove connector dustcap. - connect copy recorder to connector.	
5. On panel 21VU: - close circuit breaker 7TU.	On panel 442VU: - DFDR fault indicator light remains on. At DFDR and copy recorder: - All 8 tracks are copied in parallel (15 min. copy, 15 min. tol position).
6. On panel 21VU: - open circuit breaker 7TU.	On panel 442VU: - DFDR fault indicator light remains on.
7. On DFDR front plate: - disconnect copy recorder. - install dustcap.	
8. On panel 21VU: - close circuit breaker 7TU.	On panel 442VU: - DFDR fault indicator light goes off.
9. On panel 442VU: - press pushbutton switch GND CTL 51TU.	On panel 442VU: - DFDR fault indicator light comes on. - blue indicator light GND CTL goes off.

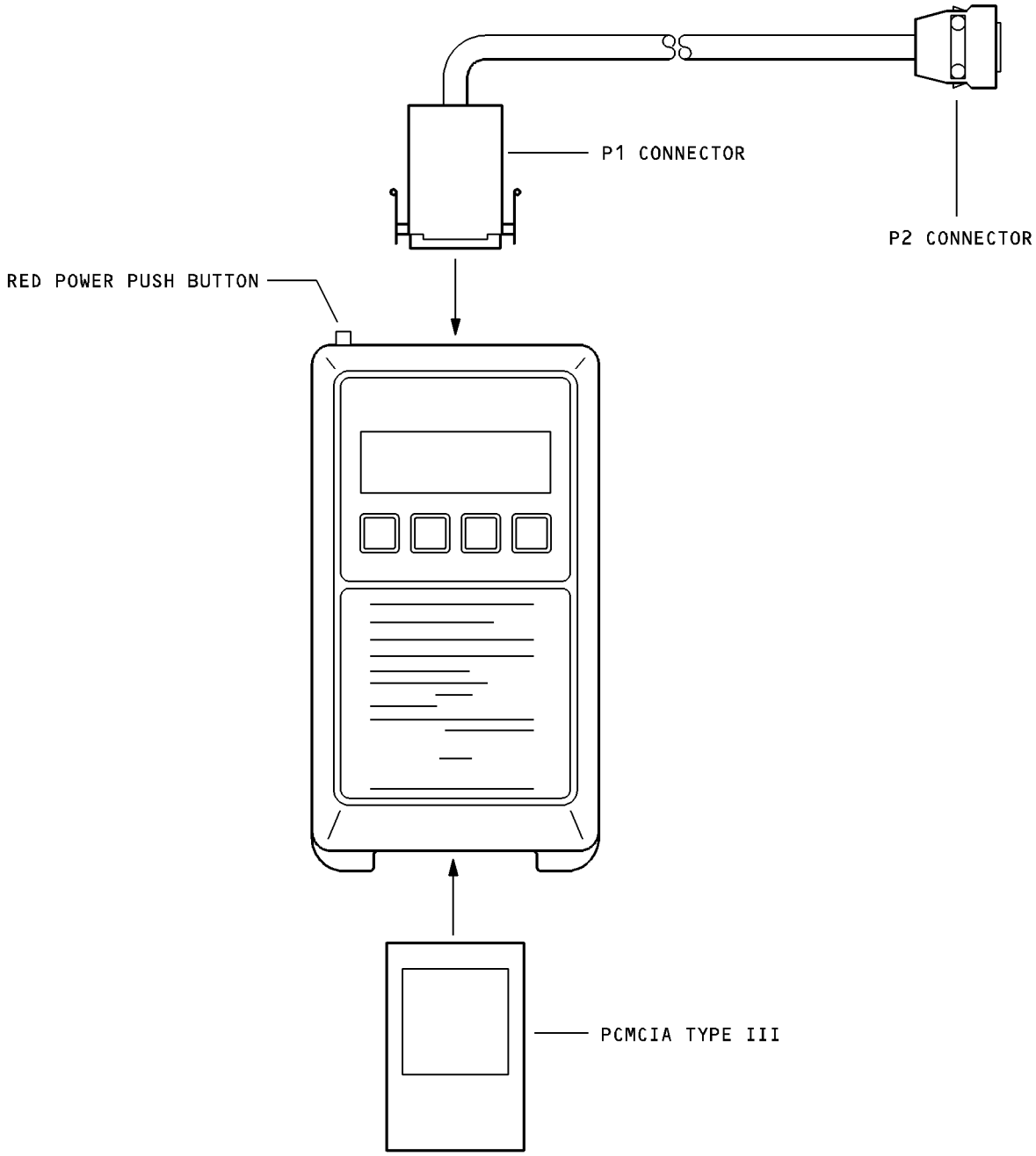
**ON A/C 105-200,

(4)OQAR Fault Monitoring Test

ACTION	RESULT
At the electronics rack 82VU, On OQAR (56TU): 1. Open the OQAR front access door and remove the disk. 2. Reinstall the disk and close the door.	In The flight compartment, on panel 442VU: -The QAR and TAPE fault indicator lights come on. -The QAR and TAPE fault indicator lights go off.

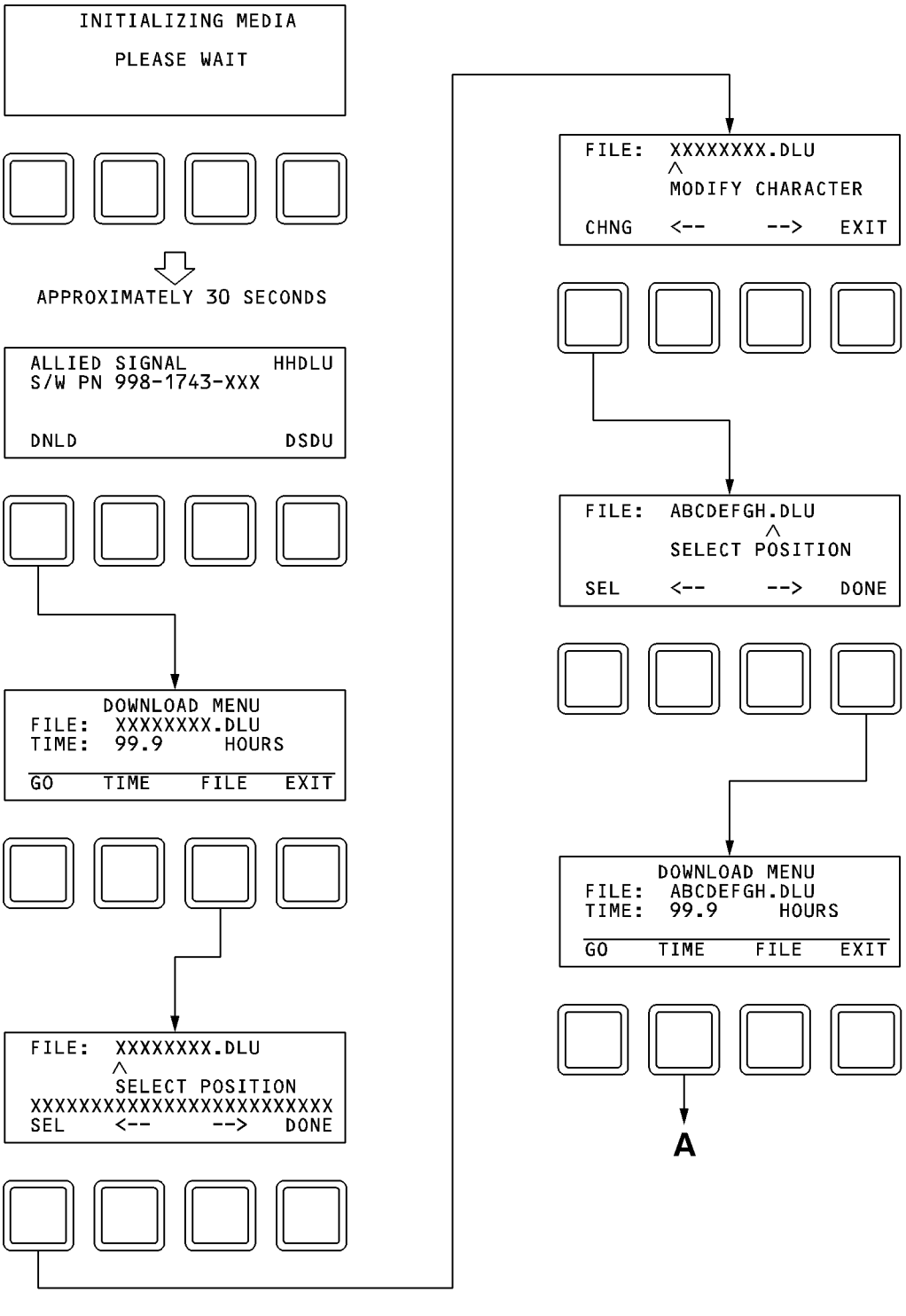
**ON A/C ALL

D. Close-Up
(1)Make certain that working area is clean and clear of all tools and miscellaneous items of equipment.
(2)De-energize electrical network and disconnect ground power unit



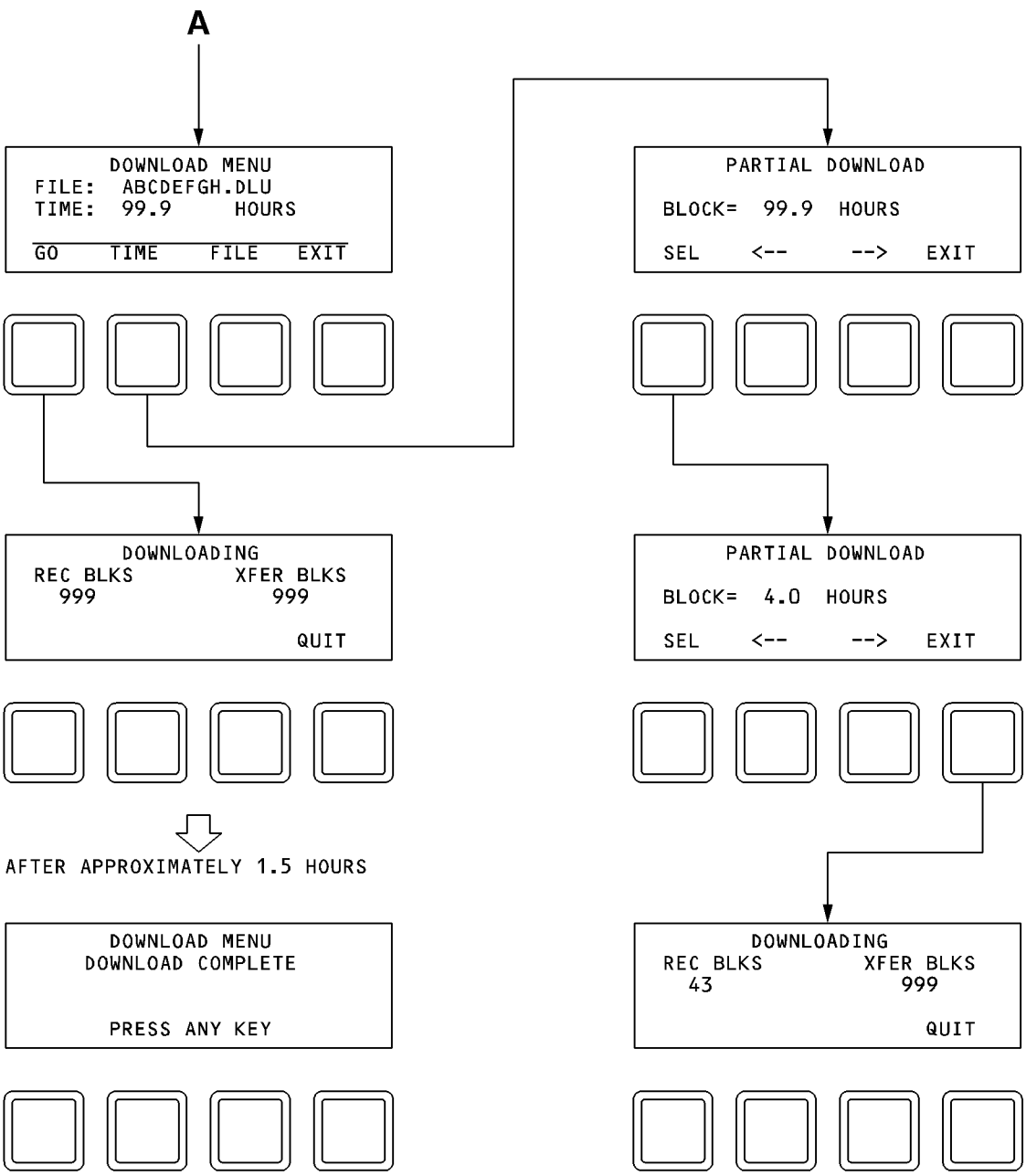
BM6 31 31 00 5 AGA0 00

Hand Held Download Unit
Figure 504



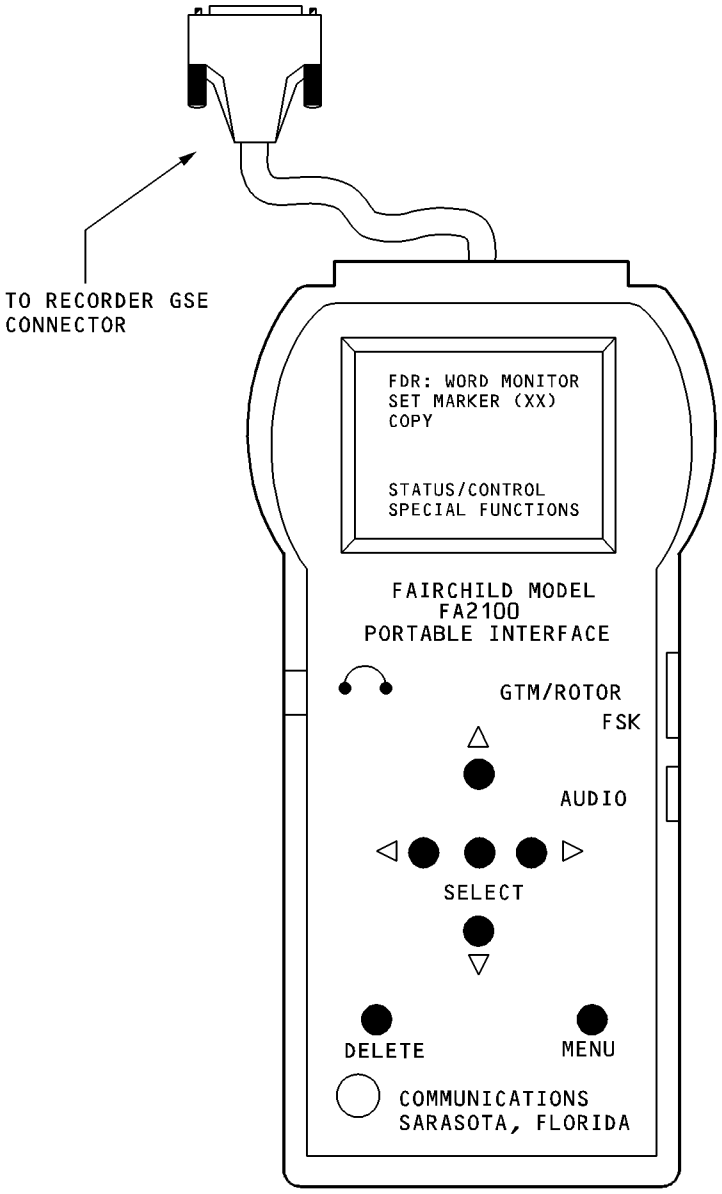
BM6 31 31 00 5 AHA0 00

Task Download with HHDLU
Figure 505



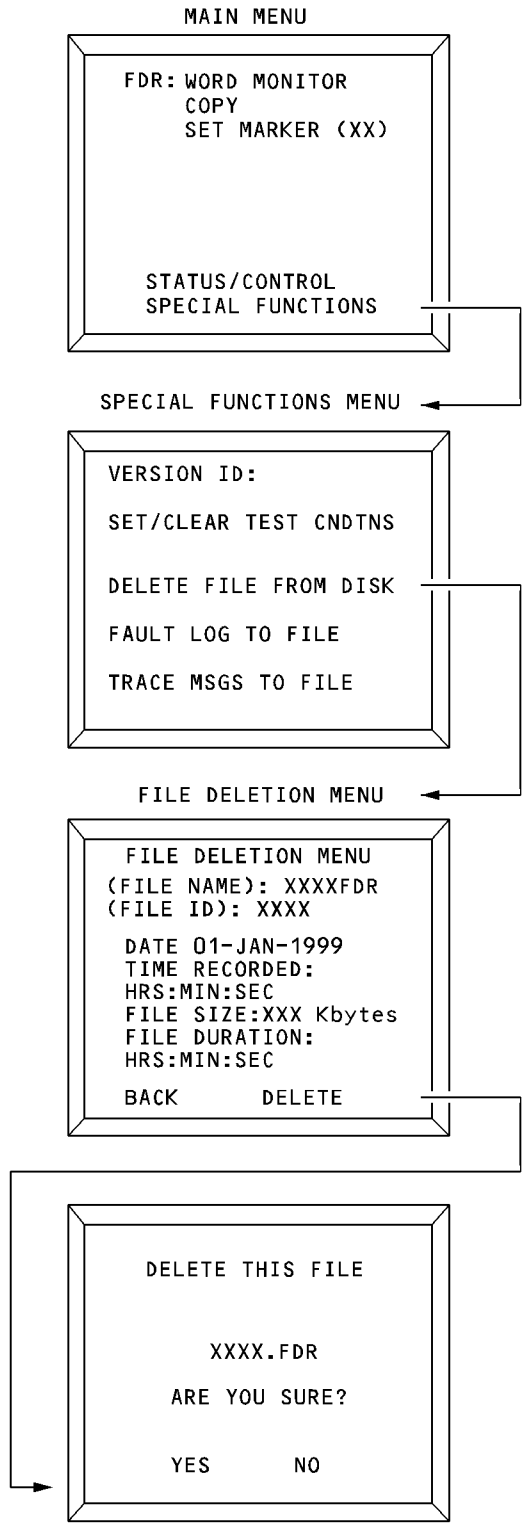
BM6 31 31 00 5 AHB0 00

Task Download with HHDLU
Figure 506



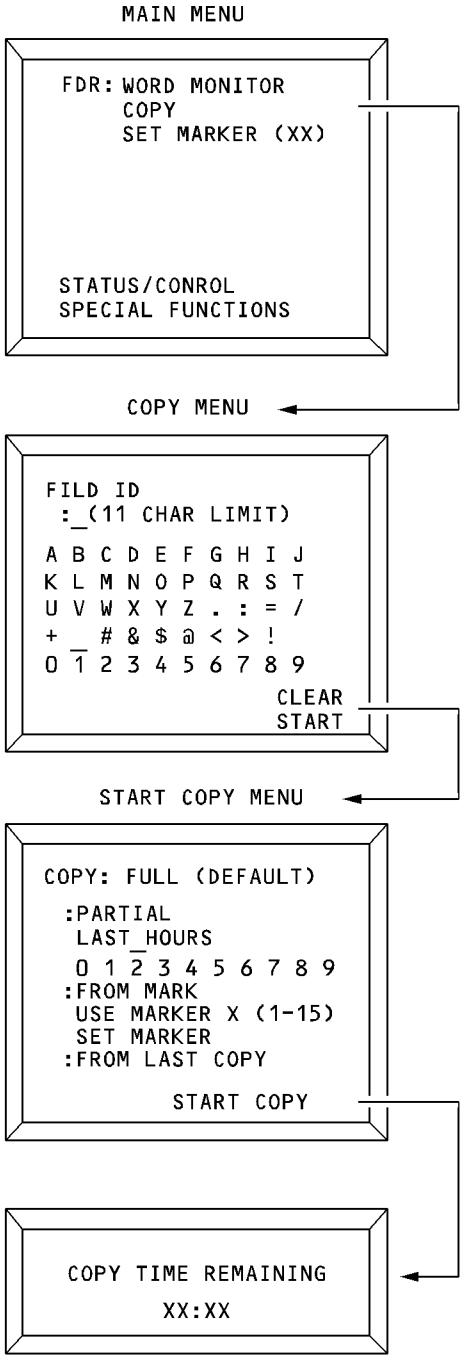
BM6 31 31 00 5 AGCO 00

Portable Interface (PI)
Figure 507



BM6 31 31 00 5 AHD0 00

Delete Files on the Card Disk
Figure 508



BM6 31 31 00 5 AHE0 00

Download Procedure of the DFDR Data
Figure 509

(Ref. 24-41-00, P. Block 301).

**ON A/C 001-100,

2. System Test
WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase 115/200 V, 400 Hz, 90 kVA
(2)35M5M01123600	Test Set - AIDS O
(3)	ARINC 429 Tester

Referenced Procedures

- 24-41-00, P. Block 301	AC External Power Control	D
- 29-10-00, P. Block 301	Main Hydraulic Power - Pressurization/ Depressurization	D D

B. Job Set-Up
(1)Connect electrical ground power unit and energize electrical network (Ref. 24-41-00, P. Block 301).
(2)Make certain that electronics racks ventilation is correct.
(3)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION	
21VU	AIDS/DFDR	7TU	E 2	
21VU	AIDS/EYP	54TU	E 4	
21VU	AIDS/DFDAU	55TU	E 3	
21VU	RCDR/CTL	5RK	F27	

(4)Using interconnecting

**ON A/C 101-200,

2. System Test
WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

A. Equipment and Materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase 115/200 V, 400 Hz, 90 kVA
(2)35M5M01124200	Test Set - AIDS O

ITEM	DESIGNATION
(3)	ARINC 429 Tester

Referenced Procedures
- 24-41-00, P. Block 301 — AC External Power Control D
- 29-10-00, P. Block 301 — Main Hydraulic Power - Pressurization/ D; Depressurization D

B. Job Set-Up
(1)Connect electrical ground power unit and energize electrical network (Ref. 24-41-00, P. Block 301).
(2)Make certain that electronics racks ventilation is correct.
(3)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION	
21VU	AIDS/DFDR	7TU	E 2	
21VU	AIDS/EYP	54TU	E 4	
21VU	AIDS/DFDAU	55TU	E 3	
21VU	RCDR/CTL	5RK	F27	

(4)Using interconnecting

**ON A/C ALL

(a)Connect AIDS Test Set to DFDAU (in electronics rack 94VU) using AIDS-DFDAU Test Cable Loom.
(b)On AIDS Test Set:
Switches are to be in the following positions:
NORM/PLAYBACK - NORM
Speed - 64 W/S
Biphase/RZ - Biphase
Decimal/Octal - Decimal
(c)Start-up Test Set by placing switch in ON position.
NOTE : - Selecting 0 in S/F window gives a rate of 1 reading/second, on development of sub-cycles 1 to 4.
- overflow legend comes on if WORD Selection exceeds 64, 128, 256, 512 depending on equipment tested and connecting cable loom.
- Synchro fail legend on indicates a test unit fault, no signal indicates a DFDAU fault.

(5)Parameter call-up and display
(a)With test set connected to DFDAU face:
- Read word selected
(6)Configuration
For each parameter to be checked, set equipment or system in use in configuration as indicated in P. Block 501.

C. Test
(1)Mandatory Parameters Test
(a)EFIS: SGU1 and SGU3 parameter 1 to 4 and 6 to 8 Airspeed - Heading - Altitude.
1 SGU1
- Check parameters given in table below.
- Values are obtained during ADC and IRS test.
NOTE : Hold and press the IRS buttons during the last four steps of the test.

PARAMETER SGU1 THEN 3	VALUE	ON TEST SET SELECT	READ	ON CDU MNEMONIC OR CODE
ACCURATE ALTITUDE	10000 ft. ±20	0.005 12 bit	1508 ±20	ALT 5.0005 3374 to 3444
APPROXIMATE ALTITUDE	10000 ft. ±20	1.023 12 bit	156 ±1	ALT 1.0023 233 to 235
CORRECTED AIRSPEED	367 kts ±4	0.019 12 bit	1468 ±16	CAS 5.0019 2654 to 2714
ANGLE OF ATTACK	41° ±0.25	0.026 10 bit	234 ±2	AOA 5.0043 150 to 170
HEADING	15° ±1 to the right	0.003	42 ±3	MH 5.003 234 to 264
PITCH	5° ±1 nose-up	0.016 10 bit	28 ±6	PTCH 5.0051 130 to 210
ROLL	45° ±1 roll to the right	0.017	128 ±3	ROLL 5.0017 764 to 1014

2 SGU3

ACTION	RESULT
On panel 402VU: - press pushbutton switch EFISSGU.	On panel 402VU: - indicator light SYS 3 comes on.

NOTE : As in SGU1 check correct operation of parameters given in tables.

(b)Radio Altimeter Parameter No. 5

-On avionics system test section of panel 470VU, press RAD ALT1 pushbutton switch to obtain a test value of 40 ft.

CORRESPONDING ALTITUDE	ON TEST SET SELECT	ON TEST SET READ	ON CDU MNEMONIC OR CODE
TEST 40 ft. ±2	0.044 bit 12	20 ±1	R.ALT 5.044 23 to 25

(c)Acceleration Vertical, Lateral and Longitudinal Parameter No. 9, 10 and 11.

ACCELERATION	CORRESPONDING ALUES	ON TEST SET SELECT	ON TEST SET READ	ON CDU MNEMONIC OR CODE
VERTICAL	+l g ±0,01	0.013 10 bit	477 ±10	VRTG 5.0061 3514 to 3634
LATERAL	0 g ±0,01	0.015 10 bit	532 ±5	LATG 5.0063 4074 to 4144
LONGITUDINAL	0 g ±0,01	0.002 12 bit	2130 ±20	LONG 5.0050 4074 to 4144

(d)ILS1 Parameter No. 12 and 13

Check LOCALIZER and GLIDE SLOPE parameter operation.

NOTE : This deviation can be obtained:

- using an ILS beacon simulator
- ILS (GS) test second phase, by pressing ILS1 pushbutton switch on avionics SYS TEST section.

DESIGNATION	POINTER ON EFIS	ON TEST SET SELECT	ON TEST SET READ	ON CDU MNEMONIC OR CODE
LOCALIZER	CENTERED 1 DOT to right	0.010 bit 12	0 ±20 397 ±20	LOC 5.0010 571 to 641
GLIDE SLOPE	CENTERED			GLS 5.0023

DESIGNATION	POINTER ON EFIS	ON TEST SET SELECT	READ	ON CDU MNEMONIC OR CODE
	1 DOT down	0.051 bit 10	0 ±20 56 ±5	314 to 364

(e)GMT Display Parameter No. 14
- Set Pilot clock to correct time.
- On test set, do not select a label address, select GMT ARINC 717:
  On a separate window, the reading represents hours, minutes, and seconds. If this switch is not installed on the test set, read GMT by selecting 1.037, then 3.037 in BCD/HEXA frame - 1.037 tens of minutes,minutes, tens of seconds. 3.037 tens of hours, hours, tens of minutes.

Date
- On Pilot clock a date is displayed (i.e.: 12.25).
- On test set, select 2.023, bit 12 status, select switch in BOD/HEXA position.
- Read successive cycles, 1st digit indicates cycle number, from 0 to F.
  cycle 1, read 125 (DAY)
  cycle 2, read 212 (MONTH).

(f)Flight Controls (Bus SDAC), Parameter No. 15 to 19
- Left all speed aileron
- Right all speed aileron
- Trimmable horizontal stabilizer
- Elevator control surface
- Rudder control surface.

Connect ARINC 429 test set on plug 62FL1, pins X, Y.
Select labels indicated in the table below on ARINC test set to get the angular deflection values. Right ECAM unit only displays 0 and stop operations.

DESIGNATION LABEL	ON TEST SET SELECT 10 BIT	READ	CORRESPONDING ANGULAR DEFLECTION	ON CDU MNEMONIC OR CODE
LEFT AIL. 1.210	0.014	980 ±3	-15° ±1 RIGHT TURN	AIL.L 5.0009 7504 to 7534
RIGHT AIL. 2.310	0.040	43 ±3	+15° ±1	AIL.R 5.0040 240 to 270
T.H.S. 0.315	0.022 12 bit	58 ±1	+5° ±0.25 NOSE UP	STAB 6.0055 64 to 74
ELEVATOR 0.314	0.041	57 ±3	20° ±1 NOSE UP	ELEV 5.0041 330 to 360
RUDDER 0.312	0.027	28 ±3	10° ±1 RIGHT TURN	RUDD 5.0059 144 to 174

(g)Slats and Flaps, Parameter No. 20 and 21

NOTE : Hydraulic power must be on for the tests in steps (g) and (h). (Ref. 29-10-00, P. Block 301).

DESIGNATION	ON TEST SET SELECT	READ	LEVER NOTCH No.	ON CDU MNEMONIC OR CODE
SLATS	1021 to 0003 2.039 10 bit	461+/-9	1(0°)	7763 7.0039 to 0014
			5(25°)	3420 to 3530
FLAPS	1.039	10 bit	1021 to 0003 1(0°)	7763 6.0039 to 0014
		497+/-6	5(33.5°)	3654 to 3734

(h)Slat/Flap Asymmetry or Failure
Parameter No. 22 and 23

DESIGNATION		SELECTION : 0.017 BIT 1 (red LED)	BIT 2 (red LED)	FOR REF BUS FWC 1
SLATS	CORRECT	OFF		
	ASYMMETRY OR FAILURE	ON		LABEL 126 BIT 11
FLAPS	CORRECT	OFF		
	ASYMMETRY OR FAILURE	ON		LABEL 126 BIT 12

NOTE : Hydraulic power must be turned off after completion of tests. (Ref. 29-10-00, P. Block 301).

(i)Thrust Reversers Parameter No. 24 to 27.
Select values on test set according to table below and check annunciator lights BIT 1 or 2 (whether on or off) during thrust reverser operation. If this is not possible, connect ground to connectors given in brackets (at bottom of FWD cargo compartment), or to terminal blocks given in brackets on electronics rack 90VU. Also check that the corresponding indicator lights come on, on the center instrument panel.

ENGINE	ON TEST SET SELECTION	CORRESPONDING BIT 1 ON OR OFF	CONFIGURATION REVERSER DEPLOYED green indicator light	ON CDU MNEMO. OR CODE +2 times ENT
1	1.007	ON	(left) OFF	RVI 1 1.007
		OFF	(left) ON (5VCq) (82VT 57K)	to right BIT 1
2	2.007	ON	(right) OFF	RVI2 2.007
		OFF	(right) ON (6VCq) (82VT 58K)	to right BIT 1

ENGINE	ON TEST SET SELECTION	CORRESPONDING BIT 1 (red LED)	BIT 2 (red LED)	ON CDU CONFIGURATION REVERSER DEPLOYED REV NLK amber warning light	MNEMO. OR CODE +2 times ENT
1 and 2	0.052	ON	ON	OFF	
1		OFF	(left)	ON (5VCq) (82VT 57E)	RVU 1 5.0052 to right BIT 1
2		OFF	right)	ON (6VCp) (82VT 58E)	RVU 2 5.0052 to left BIT 2

(j)PMC Parameter No. 30 and 31 (only for PW engines).
Display the following value on N1 indicator by depressing TRIM TEST push button and setting throttle control lever to forward position.

ENGINE	N1	ON TEST SET SELECT 12 bit	READ
LEFT	80%	1.060	1280 ±64
RIGHT			2.060

(k)AP Engagements and Land Track Mode.
Parameter No. 32 to 37

API STATUS	TEST SET SELECTION : 0.031 BIT 1	BIT 2	ON CDU MNEMONIC OR CODE +2 times ENT
Disengaged	OFF	OFF	
CWS	ON		APW 1 ---> 5.0031 bit 1
CMD		ON	APM 1 <--- 5.0031 bit 2

AP2 STATUS	TEST SET SELECTION : 0.051 BIT 1	BIT 2	ON CDU MNEMONIC OR CODE +2 times ENT
Disengaged	OFF	OFF	
CWS	ON		APW 2 ---> 5.0051 bit 1
CMD		ON	APM 2 <--- 5.0051 bit 2

Following test can be performed during final sequence of AFS TEST/LAND TEST on MTP.

PHASE LAND	TEST SET SELECTION : 0.029	ON CDU MNEMONIC OR CODE +2 times ENT	
LAND TRACK NOT ENERGIZED	Bits 1 and 2 OFF	APL 2 5.0029	APL 1 5.0029
LAND TRACK ENERGIZED	Bits 1 and 2 ON (AP1 and AP2 operating)	bit 2 <--->	bit 1

(l)Communications, Parameter No. 38, 39, 43, 44 and 45.

ON TEST SET SELECTION	BIT '1' (red LED)	BIT '2' (green LED)	CORRESPONDING CONFIGURATION	ON CDU MNEMONIC OR CODE +ENT	+ENT
VHF1	0.009	ON	Not energized	VHF1	5.0009
		OFF	Transmission	to the right BIT 1	
VHF2	0.009	ON	No energized	VHF2	5.0009
		OFF	Transmission	BIT 2 to the left	
VHF3	0.026	ON	Not energized	VHF3	5.0026
		OFF	Transmission	to the right BIT 1	
HF1	0.047	ON	Not energized	HF1	5.0047
		OFF	Transmission	BIT 2 to the left	
HF2	0.047	ON	Not energized	HF2	5.0047
		ON	Transmission	BIT 2 to the left	

(m)Marker Beacons, Parameter No. 40, 41 and 42.
MKR indications can be obtained:
- Using a MKR beacon simulator
- Depressing the VOR/MKR test pushbutton on system test section of panel 47OVU
(INNER, MIDDLE, OUTER MKR ARE ON SIMULTANEOUSLY).

BEACON SELECTION		LIGHTS ON TEST SET BIT 1 (red LED)	LIGHTS ON TEST SET BIT 2 (red LED)	M.K.R. blue indicator light status	ON CDU MNEMONIC OR CODE + 2 times ENT
AWY					
INNER	0.026	ON	ON	IMK	
		OFF	OFF		BIT 2 to the right
MIDDLE	0.003	ON	ON	MMK	
		OFF	OFF		BIT 2 to the right
OUTER	0.003	ON	ON	OMK	
		OFF	OFF		to left BIT 1

D. Close-Up
(1)On completion of each test:
- place ON-OFF switch on test set in OFF position.
(2)Open, safety and tag circuit breakers 7TU, 54TU, 55TU and 5RK.
(3)Disconnect cable loom between test set and DFDAU.
(4)Remove safety clips and tags and close circuit breakers 7TU, 54TU and 5RK.
(5)Make certain that working area is clean and clear of all tools and miscellaneous items of equipment.
(6)De-energize electrical network and disconnect ground power unit (Ref. 24-41-00, P. Block 301).

3. Operational Test of Underwater Locator Beacon (ULB)

NOTE : You can use the Ultrasonic Test Set or the Pinglite Test Set PL1/PL3.

A. Operational Test of the Underwater Locator Beacon with the Ultrasonic Test Set
(1)Reason for the Job
To test the correct function of the underwater locator beacon.
NOTE : The Underwater Locator Beacon (ULB) is mounted on the front panel of the Digital Flight Data Recorder. The unit has a self - contained battery.
(2)Equipment and Materials

ITEM	DESIGNATION
(a)	Access Platform 6 m (19 ft. 8 in.)
(b)	Ultrasonic Test Set (DUKANE CORP)
(c)	Stopwatch

Referenced Procedures
- 23-71-36, P. Block 401 Under Water Locating Beacon D
- 52-52-15, P. Block 401 AFT Cabin Underfloor Compartment Door D

(3)Procedure

(a)Job Set-Up

1 Position access platform at BULK cargo compartment door (Zone 813).

2 Open BULK cargo compartment door (Zone 813).

3 Open the access panel 162AZ (Ref. 52-52-15, P. Block 401).

4 Look at the batterie replacement label on the ULB.

5 Replace the ULB if life time of the batterie is reached. (Ref. 31-31-36, P. Block 401).

6 On Ultrasonic Test Set

a Set the INPUT Selector to INT position.

b Activate the test set and check for operation by jingling a set of keys, coins or other available noise maker near the test set microphone.

c Set TUNING Control between 35 and 40 KHz.

d Set the GAIN Potentiometer to the maximum position.

7 Establish a temporary circuit across the water switch of the ULB by means of a metal braid or other fexible conductor.

8 Place the test set microphone as near as possible to the beacon and tune test set to get the best signal.

(b)Test with the Ultrasonic Test Set

ACTION	RESULT
1. With a stopwatch, count the number of pulses from the ULB during a cycle of 10 seconds.	
2. Calculate the pulse rate: - divide the number of pulses during the cycle by the number of seconds (10 seconds).	The pulse rate must be approximately one pulse per second.
3. You can measure the pulse duration with an oscilloscope connected to the output of the test receiver.	
4. You can measure the transmission frequency of the ULB with the test receiver tuned to this frequency.	On the test receiver: - read the frequency at the TUNING dial.

NOTE : In air, the pulse duration will be longer and the pulse repetition rate will be slower than during tests performed by the manufacturer. However, an accelerated or increasing pulse repetition rate indicates that the battery must be replaced (Ref. 31-31-36 P. Block 401). If the ULB does not function normally after batterie replacement the beacon should be replaced (Ref. 31-31-36, P. Block 401).

(c)Close-Up

1 Remove the temporary circuit across the water switch of the ULB by means of a metal braid or other fexible

conductor.
2 Make certain that working area is clean and clear of all tools and miscellaneous items of equipment.
3 Install the access panel 162AZ (Ref. 52-52-15, P. Block 410).
4 Close BULK cargo compartment door (Zone 813).
5 Remove access platform.

B. Operational Test of the Underwater Locator Beacon with the Pinglite Tester PL 1

(1)Reason for the Job

To test the correct function of the underwater locator beacon.

NOTE : The Underwater Locator Beacon (ULB) is mounted on the front panel of the Digital Flight Data Recorder. The unit has a self - contained battery.

(2)Equipment and Materials

ITEM	DESIGNATION
(a)	Access Platform 6 m (19 ft. 8 in.)
(b)	Pinglite Tester PL 1 (DUKANE CORP.)

Referenced Procedures

- 23-71-36, P. Block 401 Under Water Locating Beacon D
- 52-52-15, P. Block 401 AFT Cabin Underfloor Compartment Door D

(3)Procedure

(a)Job Set-Up

1 Position access platform at BULK cargo compartment door (Zone 813).
2 Open BULK cargo compartment door (Zone 813).
3 Open the access panel 162AZ (Ref. 52-52-15, P. Block 401).
4 Look at the batterie replacement label on the ULB.
5 Replace the ULB if life time of the batterie is reached (Ref. 31-31-36, P. Block 401).
6 On Pinglite Tester PL 1
a Establish a temporary short circuit between the device water switch center pin and the case, using a pice of metal braid or flexible conductor.

(b)Test with the Pinglite Tester PL 1

ACTION	RESULT
1. On the pinglite tester PL 1: Put the end of the tester against the ULB approximately 1 inch (25.4 mm) from water switch end.	
2. Push and hold the OPERATION pushbutton on test set.	A light flash indicates that tester is operating. THE BEACON indicator lamp on

ACTION	RESULT
	tester flashes with each output pulse from ULB, to verify its operation.

3. Release the OPERATION pushbutton.

NOTE : No flashing on the tester indicates a dead batterie or defective ULB. However, an accelerated or increasing pulse repetition rate indicates that the battery must be replaced (Ref. 31-31-36 P. Block 401). If the ULB does not function normally after batterie replacement the beacon should be replaced (Ref. 31-31-36, P. Block 401).

(c)Close-Up

1 Remove the temporary circuit across the water switch of the ULB.

2 Make certain that working area is clean and clear of all tools and miscellaneous items of equipment.

3 Install the access panel 162AZ (Ref. 52-52-15, P. Block 401).

4 Close BULK cargo compartment door (Zone 813).

5 Remove access platform.

C. Operational Test of the Underwater Locator Beacon with the Pinglite Tester PL 3

(1)Reason for the Job

To test the correct function of the underwater locator beacon.

NOTE : The Underwater Locator Beacon (ULB) is mounted on the front of the Digital Flight Data Recorder. The unit has a self-contained battery.

(2)Equipment and Materials

ITEM	DESIGNATION
(a)	Access Platform 6 m (19 ft. 8 in.)
(b)	Pinglite Tester PL 3 (DUKANE CORP.)

Referenced Procedures

- 23-71-36, P. Block 401 Under Water Locating Beacon D
- 52-52-15, P. Block 401 AFT Cabin Underfloor Compartment Door D

(3)Procedure

(a)Job Set-Up

1 Position access platform at BULK cargo compartment door (Zone 813).

2 Open BULK cargo compartment door (Zone 813).

3 Open the access panel 162AZ (Ref. 52-52-15, P. Block 401).

4 Look at the batterie replacement label on the ULB.
5 Replace the ULB if life time of the battery is reached.(Ref. 31-31-36, P. Block 401).

(b)Test with the Pinglite Tester PL 3

ACTION	RESULT
1. Put the pinglite tester PL 3 in position and push and hold it against the ULB water switch.	On the pinglite tester PL 3: The LED is flashing with each output pulse. A pulse sound is heard.
2. Remove the tester from ULB.	

NOTE : No flashing on the tester indicates a dead battery or defective ULB. However, an accelerated or increasing pulse repetition rate indicates that the battery must be replaced (Ref. 31-31-36 P. Block 401). If the ULB does not function normally after battery replacement the beacon should be replaced (Ref. 31-31-36, P. Block 401).

(c)Close-Up
1 Remove the temporary circuit across the water switch of the ULB.
2 Make certain that working area is clean and clear of all tools and miscellaneous items of equipment.
3 Install the access panel 162AZ (Ref. 52-52-15, P. Block 410).
4 Close BULK cargo compartment door (Zone 813).
5 Remove access platform.

**ON A/C 101-104,

Post SB 31-2117 For A/C 101-104,

DIGITAL FLIGHT DATA ACQUISITION MANAGEMENT UNIT 2TU-REMOVAL/INSTALLATION

**ON A/C ALL

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure - 31-31-00, P. Block 501	AIDS Interconnection Interfaces

**ON A/C 001-003,

(Ref. Fig. 401)

**ON A/C 101-104,

Post SB 31-2117 For A/C 101-104,

R (Ref. Fig. 402)

**ON A/C 101-200,

(Ref. Fig. 403)

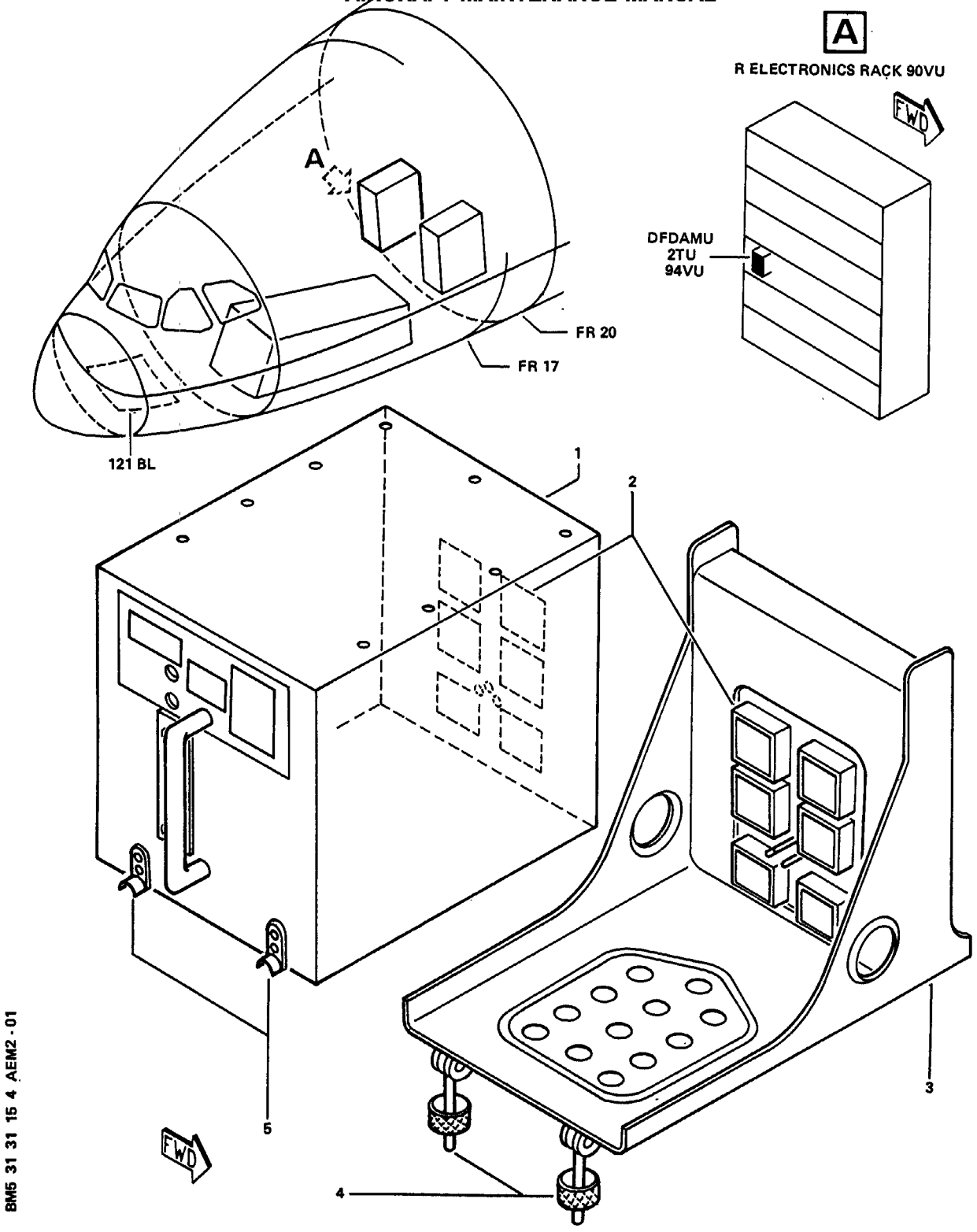
**ON A/C 004-100,

(Ref. Fig. 404)

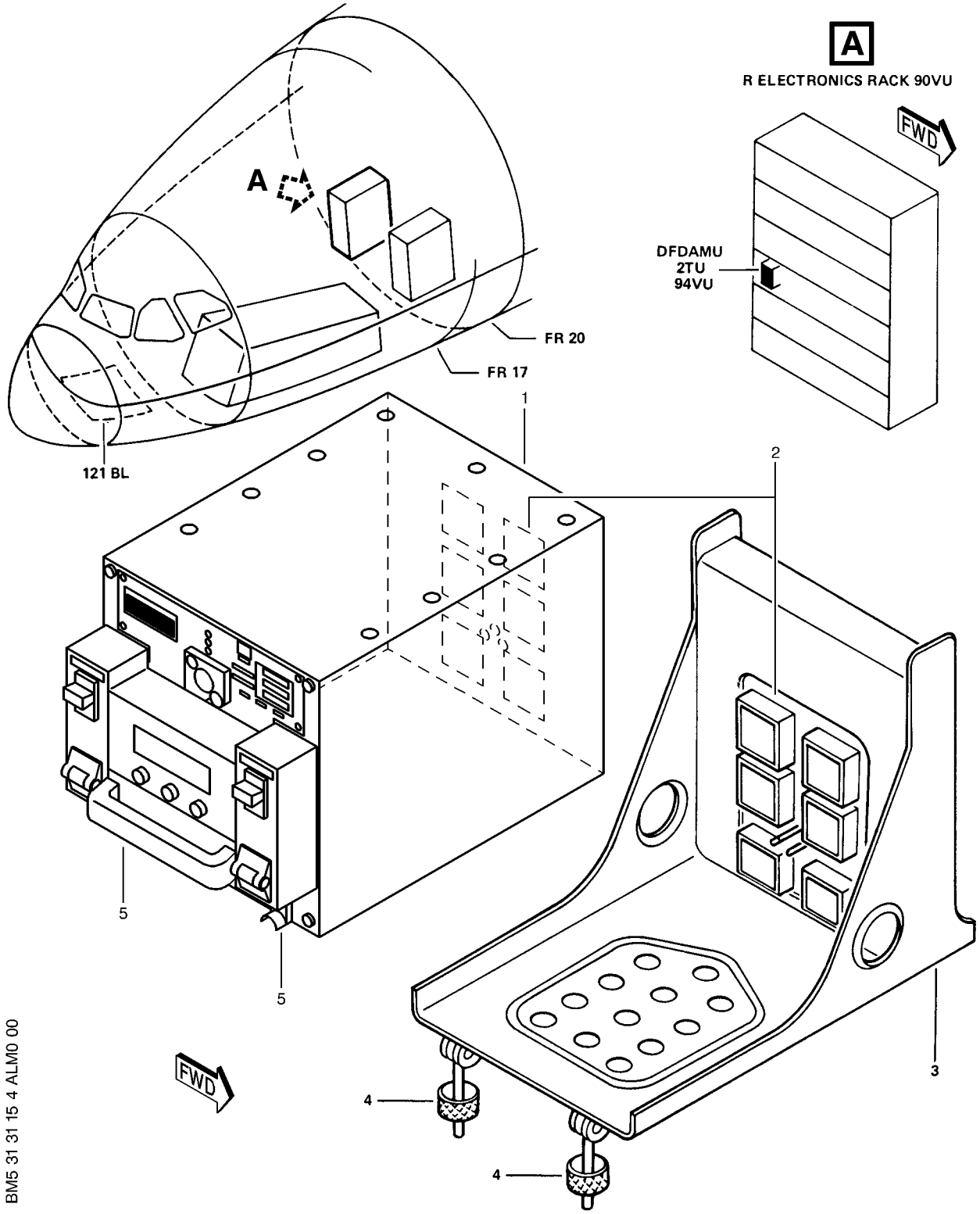
**ON A/C ALL

2. Procedure

A. Job Set-Up

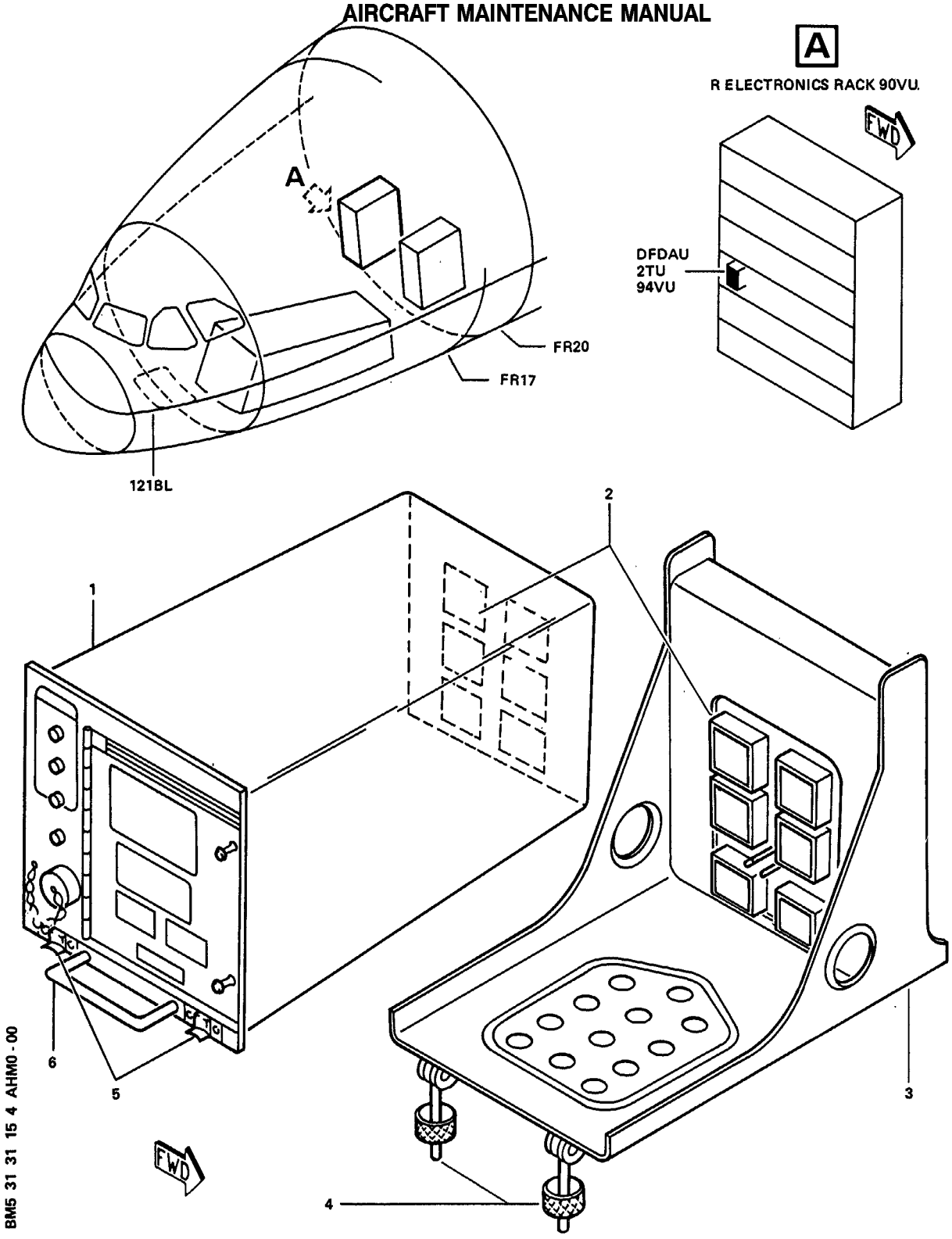


Digital Flight Data Acquisition Management Unit
Figure 401

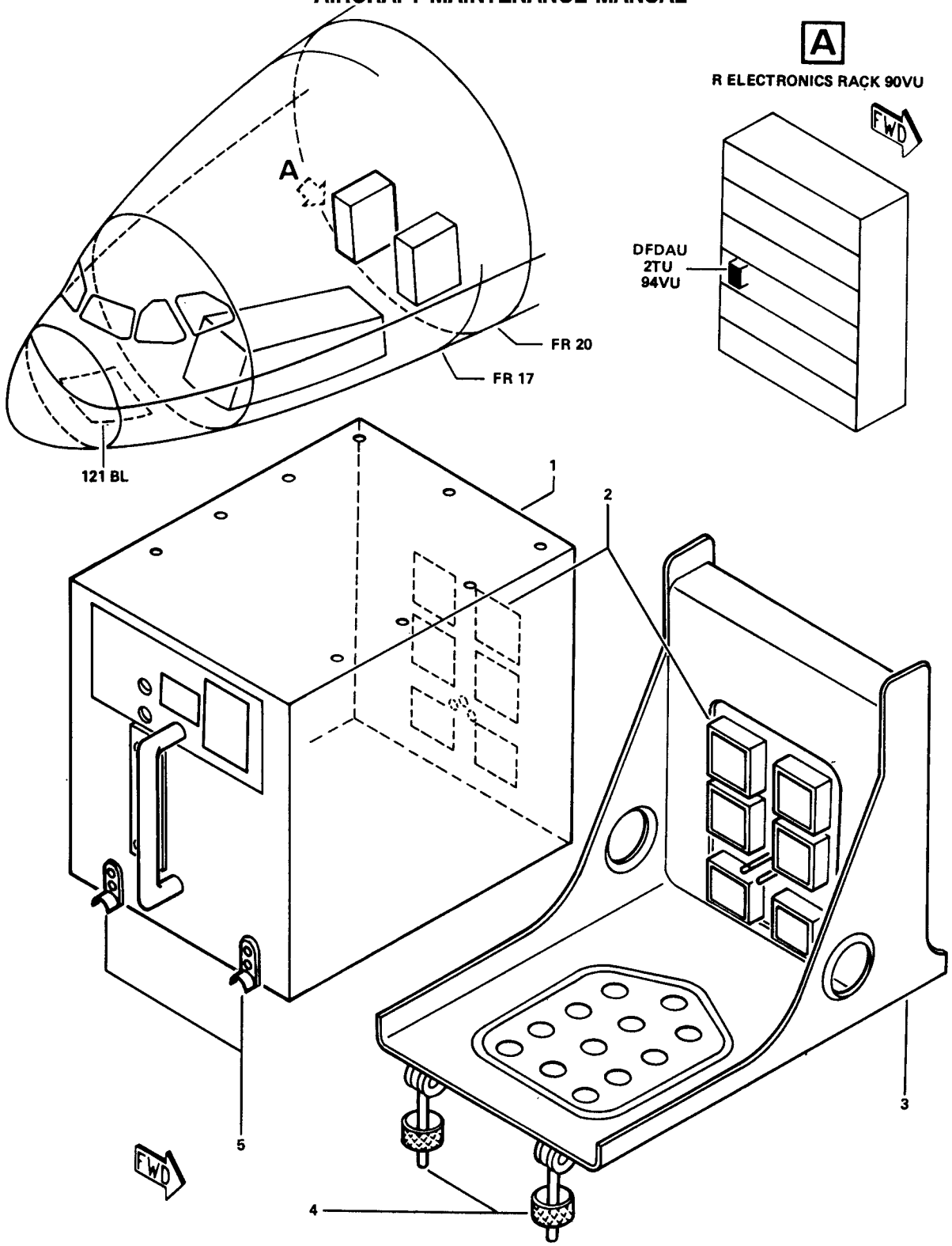


Digital Flight Data Acquisition Management Unit
Figure 402

R



Digital Flight Data Acquisition Unit
Figure 403



Digital Flight Data Acquisition Unit
Figure 404

(1)Open, safety and tag the following circuit breaker :

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/DFDAU	55TU	105/E03

(2)Open access door 121BL to gain access to avionics compartment (R electronics rack 90VU).

B. Removal
(1)Unscrew knurled nuts (4) and tilt them downwards to disengage them from lugs (5).
(2)Carefully withdraw DFDAU (1) from rack (3).
(3)Blank electrical connectors (2).
(4)Remove DFDAU (1).

C. Installation
(1)Clean and inspect DFDAU interface and/or adjacent area.
(2)Remove blanking caps from electrical connectors (2). Make certain that connectors are clean and in correct condition.
(3)Install DFDAU (1) in rack (3).
(4)Engage knurled nuts (4) on lugs (5) and tighten.
(5)Remove safety clip and tag and close circuit breaker 55TU.

R **ON A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

B. Removal
(1)Unscrew knurled nuts (4) and tilt them downwards to disengage them from lugs (5).
(2)Carefully withdraw DFDAMU (1) from rack (3).
(3)Blank electrical connectors (2).
(4)Remove DFDAMU (1).

C. Installation
(1)Clean and inspect DFDAMU interface and/or adjacent area.
(2)Remove blanking caps from electrical connectors (2). Make certain that connectors are clean and in correct condition.
(3)Install DFDAMU (1) in rack (3).
(4)Engage knurled nuts (4) on lugs (5) and tighten.
(5)Remove safety clip and tag and close circuit breaker 55TU.

**ON A/C ALL

D. Not applicable

E. Test

Carry out operational test of DFDAU (or DFDAMU) by performing the power interlock circuit test and fault light logic test (Ref. 31-31-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door 121BL.

R **ON A/C 101-104,

R Post SB 31-2117 For A/C 101-104,

E. Test
Carry out operational test of DFDAU (or DFDAMU) by performing the power interlock circuit test and fault light logic test (Ref. 31-31-00, P. Block 501).

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door 121BL.

THREE-AXIS ACCELEROMETER 6TU - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
C.	Corrosion Resistant Steel Lockwire, Dia. 0.813 mm (0.032 in.)
Referenced Procedure	
- 24-41-00, P. Block 301	A/C External Power Control
- 25-21-00, P. Block 401	Passengers Seats

2. Procedure

(Ref. Fig. 401)

A. Job Set-Up

(1)Open, safety and tag the following circuit breaker :

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/DFDAU	55TU	105/E03

(2)Remove passenger seats to gain access to floor panel 241AZ at center of passenger compartment, (Ref. 25-21-00, P. Block 401).

(3)Remove floor panel 241AZ.

B. Removal

(1)Cut and remove lockwire (1).

(2)Loosen the three mounting bolts (2), retain them with their washers (3).

(3)Remove accelerometer from its support so that electrical connector can be reached.

(4)Disconnect electrical plug (4).

(5)Remove accelerometer.

CAUTION : HANDLE ACCELEROMETER WITH CARE, AVOIDING SHOCKS AND SUDDEN MOVEMENTS WHICH MAY DAMAGE MOVING PARTS.

(6)Cap plug (4) and receptacle (5).

C. Installation

(1)Clean and inspect accelerometer interface and/or adjacent area.

(2)Remove blanking caps from electrical connectors (4) and (5), and check for correct condition of connector end.

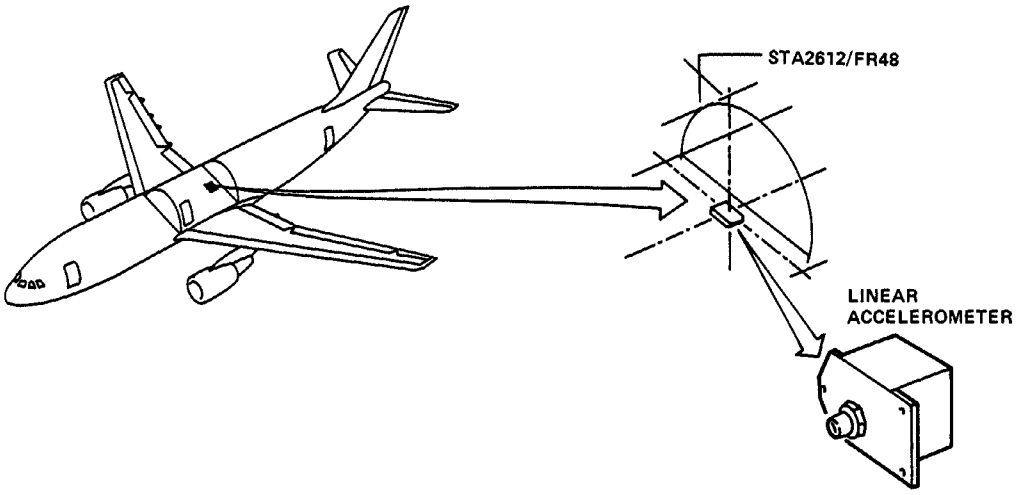
(3)Connect electrical plug (4) to receptacle (5).

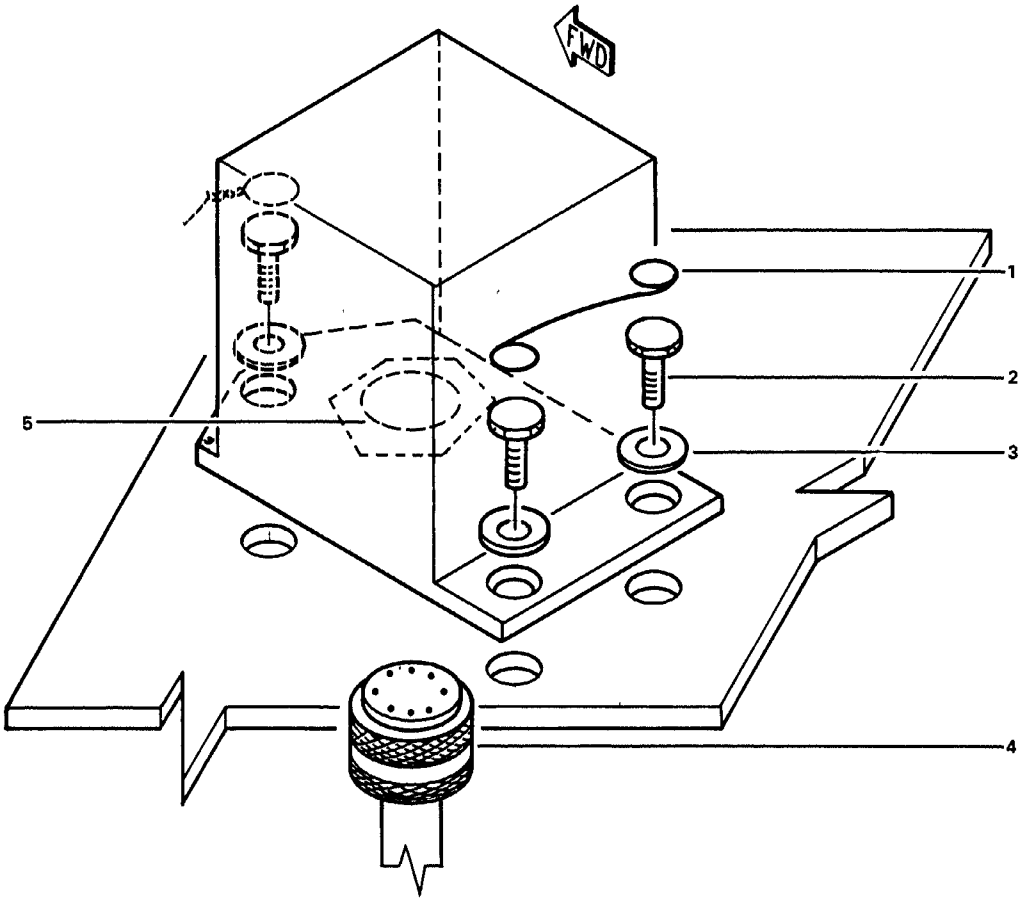
(4)Install accelerometer on its support.

(5)Install the three mounting bolts (2) with their washers (3).

(6)Tighten bolts and safety with corrosion resistant steel lockwire.

R D. Test





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Three - Axis Accelerometer
Figure 401

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Equipment and materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase 115/200 V, 400 Hz, 90 kVA Test Set - AIDS
Referenced Procedures - 24-41-00, P. Block 301 - 31-31-00, P. Block 501	 AC External Power Control System Test

(2)Job set-up

(a)Connect electrical ground power unit and energize electrical network (Ref. 24-41-00, P. Block 301).

(b)Make certain that electronics racks ventilation is correct.

(c)Make certain that the following circuit breaker is closed :

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/DFDAU	55TU	105/E03

(d)Using interconnecting

- Connect AIDS Test Set to DFDAU (in electronics rack 94VU) using AIDS-DFDAU Test Set Cable Loom.
- On AIDS Test Set :
  Switches are to be in the following positions :
  NORM/PLAYBACK - NORM
  Speed - 64 W/S
  Biphase/RZ - Biphase
  Decimal/Octal - Decimal
- Start-up Test Set by placing switch in ON position.
  NOTE : - Selecting 0 in S/F window gives a rate of 1 reading/second, on development of sub-cycles 1 to 4.
  - Overflow legend comes on if WORD Selection exceeds 64, 128, 156, 512 depending on equipment tested and connecting cable loom.
  - Synchro fail legend on indicates a test unit fault, no signal indicates DFDAU fault.

Acceleration Vertical, Lateral and Longitudinal

	ACCELERATION	CORRESPONDING VALUES	ON TEST SET SELECT	READ
R	VERTICAL	+ 1 g ± 0,01	0.013 10 bit	477 ± 10
	LATERAL	0 g ± 0,01	0.015 10 bit	532 ± 5

ACCELERATION	CORRESPONDING VALUES	ON TEST SET SELECT	READ
LONGITUDINAL	0 g ± 0,01	0.002 12 bit	2130 ± 20

**ON A/C 101-104,

Post SB 31-2117 For A/C 101-104,

D. Test

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Equipment and materials

ITEM	DESIGNATION
(1)	Electrical Ground Power Unit - 3-Phase 115/200 V, 400 Hz, 90 kVA
R (2)35M5M0-112-4500	Test Set - AIDS
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 31-31-00, P. Block 501	System Test

(2)Job set-up

(a)Connect electrical ground power unit and energize electrical network (Ref. 24-41-00, P. Block 301).

(b)Make certain that electronics racks ventilation is correct.

(c)Make certain that the following circuit breaker is closed :

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/DFDAU	55TU	105/E03

(d)Using interconnecting

- Connect AIDS Test Set to DFDAU (in electronics rack 94VU) using AIDS-DFDAU Test Set Cable Loom.
- On AIDS Test Set :
  Switches are to be in the following positions :
  NORM/PLAYBACK - NORM
  Speed - 64 W/S
  Biphase/RZ - Biphase
  Decimal/Octal - Decimal
- Start-up Test Set by placing switch in ON position.
  NOTE : - Selecting 0 in S/F window gives a rate of 1 reading/second, on development of sub-cycles 1 to 4.

- Overflow legend comes on if WORD Selection exceeds 64, 128, 156, 512 depending on equipment tested and connecting cable loom.
- Synchro fail legend on indicates a test unit fault, no signal indicates DFDAU fault.

Acceleration Vertical, Lateral and Longitudinal

ACCELERATION	CORRESPONDING VALUES	ON TEST SET SELECT	READ
VERTICAL	+ 1 g ± 0,01	0.007 12 bit	1911 ± 20
LATERAL	0 g ± 0,01	0.009 10 bit	532 ± 5
LONGITUDINAL	0 g ± 0,01	0.008 10 bit	532 ± 5

**ON A/C ALL

E. Close-up
(1) On completion of each test :
- place ON-OFF switch on test set in OFF position.

(2) Disconnect cable loom between test set and DFDAU.
(3) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(4) Install floor panel 241AZ and passenger seats (Ref. 25-21-00, P. Block 401).
(5) Remove safety clip and tag and close circuit breaker 55TU.
(6) Restore system and aircraft to normal operating condition.

DIGITAL FLIGHT DATA RECORDER - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION	
A.	Access Platform, 3 m (9 ft. 10 in.)	
B.	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz	
Referenced Procedures		
- 21-21-00, P. Block 501	Flight Compartment and Electronic Rack	D
	Air Distribution	D
- 24-41-00, P. Block 301	AC External Power Control	D

2. Procedure

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

SOLID STATE FLIGHT DATA RECORDER - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 3 m (9 ft. 10 in.)
B.	Electrical Ground Power Unit - 3-Phase, 115/200 V, 400 Hz
Referenced Procedures	
- 21-21-00, P. Block 501	Flight Compartment and Electronic Rack Air Distribution
- 24-41-00, P. Block 301	AC External Power Control

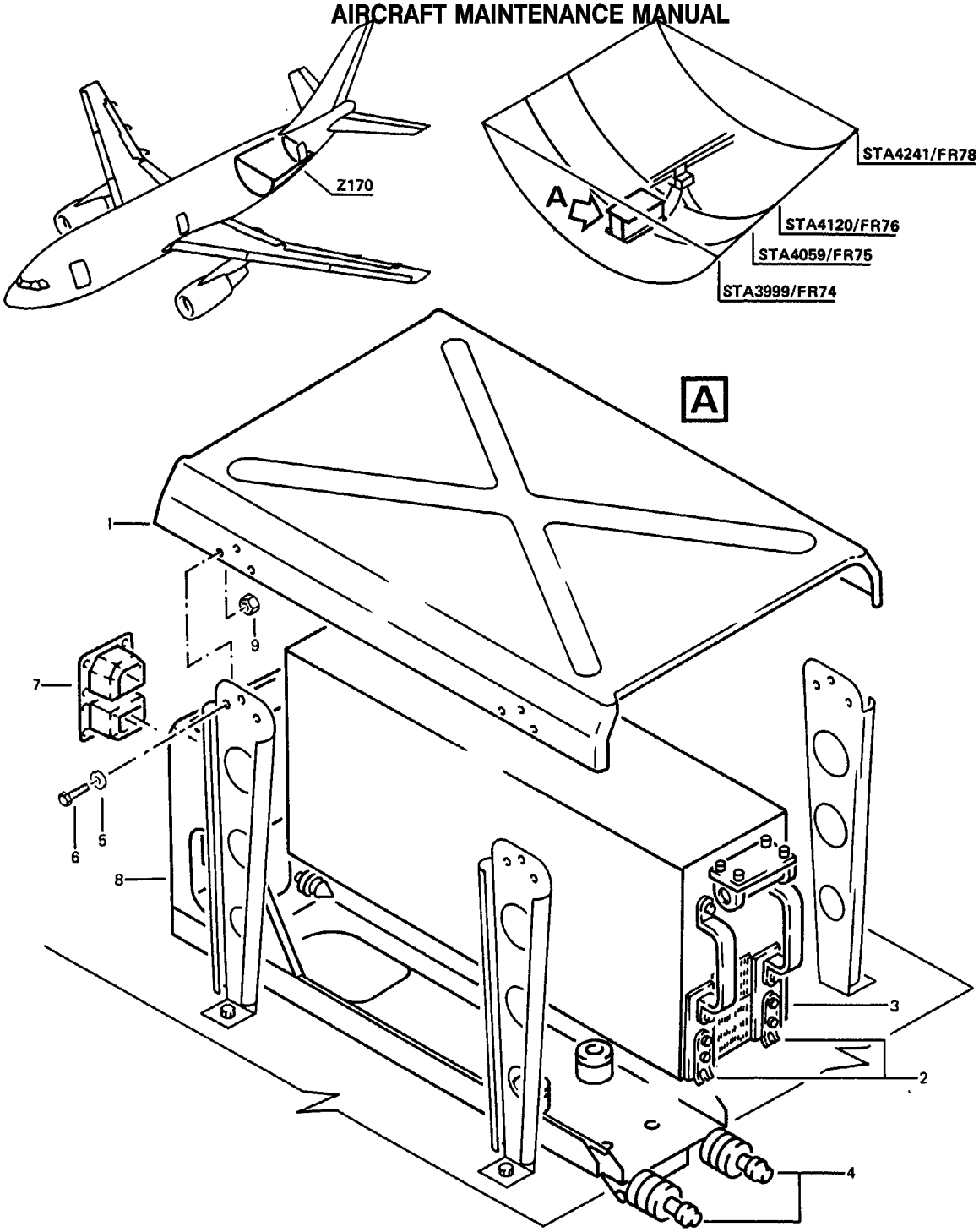
2. Procedure

**ON A/C 101-200,

(Ref. Fig. 401)

**ON A/C 001-100,

(Ref. Fig. 402)



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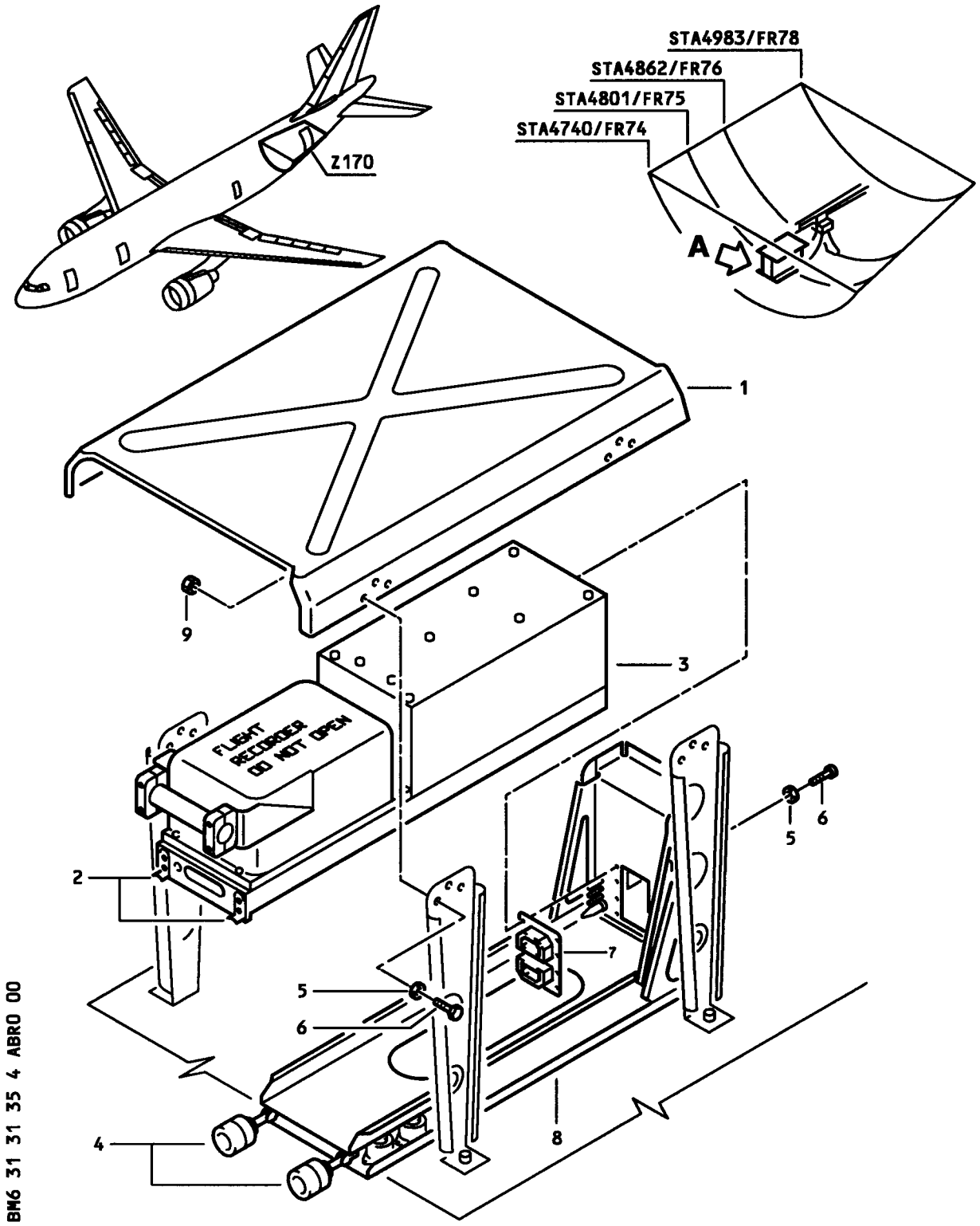
Digital Flight Data Recorder - Removal/Installation
Figure 401



Digital Flight Data Recorder - Removal/Installation
Figure 402

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

(Ref. Fig. 403)

**ON A/C ALL

A. Job Set-Up
(1)Position access platform at bulk cargo compartment door (Zone 813).
(2)Open bulk cargo compartment door (Zone 813).
(3)Open, safety and tag the following circuit breaker:

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/DFDR	7TU	105/E2

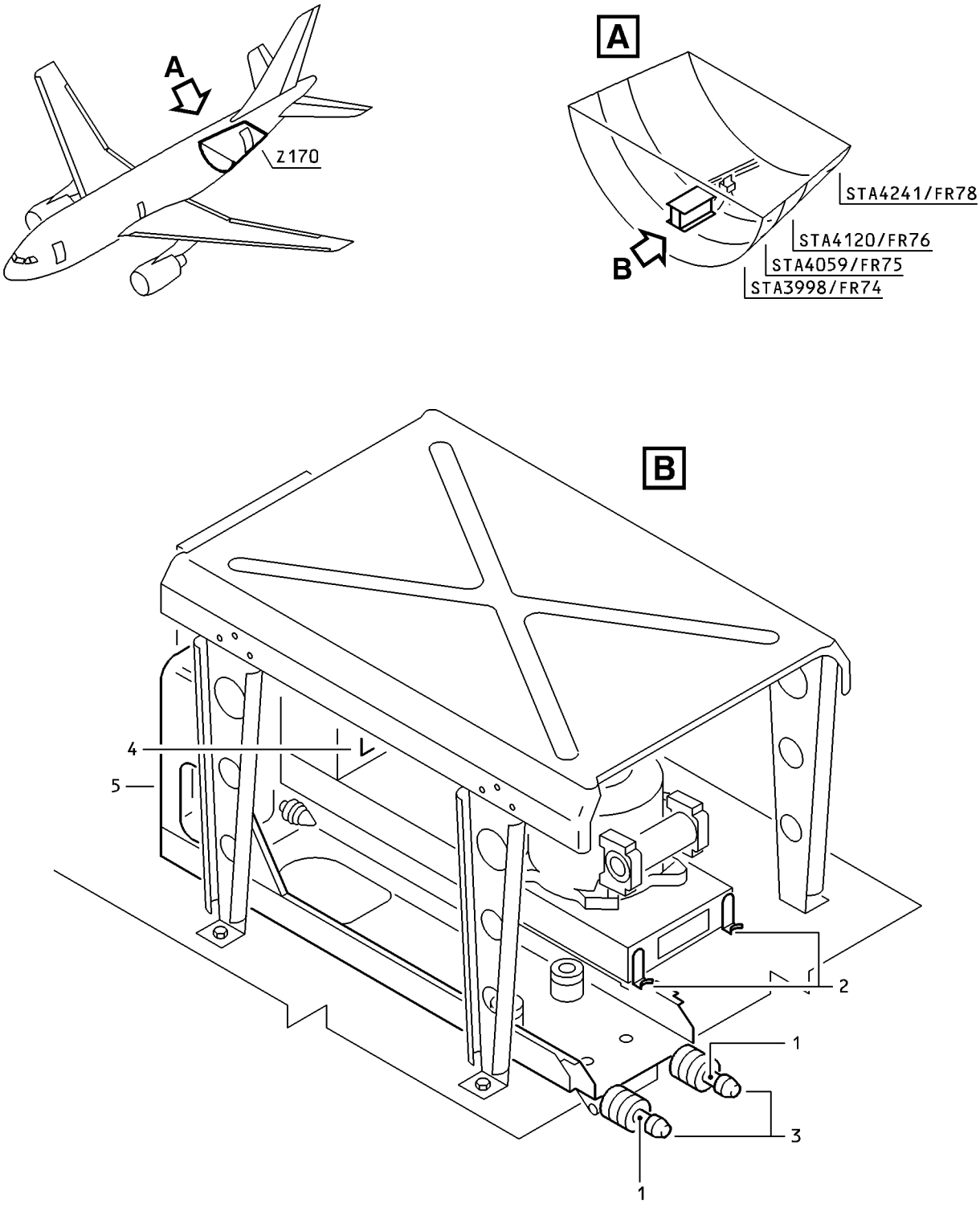
B. Removal
(1)Unscrew nuts (4) and disengage from studs (2).
(2)Remove DFDR (3) from rack (8) taking care not to damage electrical connectors (7).
(3)Blank electrical connectors (7).
(4)If the replacement flight data recorder does not have an underwater locator beacon (ULB) installed, do this task:
Underwater Locator Beacon Removal (Ref. 31-31-36, P. Block 401)

C. Installation
(1)If the flight data recorder does not have an underwater locator beacon (ULB) installed, do this task:
Underwater Locator Beacon Installation (Ref. 31-31-36, P. Block 401)
(2)Clean and inspect DFDR (3) interface and/or adjacent area.
(3)Remove blanking caps from electrical connectors (7).
(4)Install DFDR (3) in rack (8).
(5)Position nuts (4) on studs (2) and tighten.
(6)Remove safety clip and tag and close circuit breaker 7TU.

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

A. Job Set-Up
(1)Position access platform at bulk cargo compartment door (Zone 813).
(2)Open bulk cargo compartment door (Zone 813).
(3)Open, safety and tag the following circuit breaker:



Digital Flight Data Recorder - Removal/Installation
Figure 403

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/DFDR	7TU	105/E2

B. Removal
(1)Unscrew nuts (3) and disengage from studs (1).
(2)Remove DFDR (2) from rack (5) taking care not to damage electrical connectors (4).
(3)Blank electrical connectors (4).
(4)If the replacement flight data recorder does not have an underwater locator beacon (ULB) installed, do this task:
Underwater Locator Beacon Removal (Ref. 31-31-36, P. Block 401)

C. Installation
(1)If the flight data recorder does not have an underwater locator beacon (ULB) installed, do this task:
Underwater Locator Beacon Installation (Ref. 31-31-36, P. Block 401)
(2)Clean and inspect DFDR (2) interface and/or adjacent area.
(3)Remove blanking caps from electrical connectors (4).
(4)Install DFDR (2) in rack (5).
(5)Position nuts (3) on studs (1) and tighten.
(6)Remove safety clip and tag and close circuit breaker 7TU.

**ON A/C ALL

D. Test
(1)Connect electrical ground power unit and energize electrical network (Ref. 24-41-00, P. Block 301).
(2)Make certain that the flight compartment and electronics rack air distribution system is working (Ref. 21-21-00, P. Block 501).
(3)Remove safety clip and tag, close circuit breaker 7TU.
(4)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/DFDAU	55TU	E 3
22VU	RCDR/CTL	5RK	F27
133VU	LDG GEAR PROX DET & RELAYS - SYS 1/RELAYS & RETRACT/CTL	2GB	U51

(5)Test
(a)Power Interlock Circuit Test

ACTION	RESULT
1. On panel 133VU:	On panel 442VU:
- open circuit breaker 2GB to simulate A/C flight position.	- indicator light DFDR goes off.
- close circuit breaker 2GB.	- indicator light DFDR comes on.
2. On panel 442VU:	On panel 442VU:

ACTION	RESULT
- press pushbutton switch **GND CTL 51TU.**	- blue indicator light **GND CTL/ON** comes on. - indicator light **DFDR** goes off.
- press pushbutton switch **GND CTL 51TU.**	- blue indicator light **GND CTL/ON** goes off. - indicator light **DFDR** comes on.
- press pushbutton switch **GND CTL 51TU.**	- blue indicator light **GND CTL/ON** comes on. - indicator light **DFDR** goes off.
3. On panel 22VU:	On panel 442VU:
- open circuit breaker **5RK.**	- blue indicator light **GND CTL/ON** goes off.
- close circuit breaker **5RK.**	- indicator light **DFDR** comes on after **5** min. ±10%.

(b)Control Panel Fault Light Logic Test

ACTION	RESULT
1. On panel 442VU:	On panel 442VU:
- press pushbutton switch **GND CTL 51TU.**	- blue indicator light **GND CTL/ON** comes on. - **DFDR** fault indicator light goes off.
2. On panel 21VU:	On panel 442VU:
- open circuit breaker **7TU.**	- **DFDR** fault indicator light comes on.
- open circuit breaker **55TU.**	- **DFDR** fault indicator light goes off.
- **DFDAU** fault indicator light	comes on.
- close circuit breaker **55TU.**	- **NOTE** : It is possible for the **DFDR** fault indicator light to come on momentary and go off.
R R	- fault indicator light **DFDAU** goes off, and **DFDR** comes on.
- close circuit breaker **7TU.**	- **DFDR** fault indicator light goes off.
3. On panel 442VU:	
- press pushbutton switch **GND CTL 51TU.**	- blue indicator light **GND CTL/ON** goes off. - **DFDR** fault indicator light comes on.

E. Close-Up

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2)De-energize electrical network and disconnect ground power unit (Ref. 24-41-00, P. Block 301).
(3)Close bulk cargo compartment door (Zone 813).
(4)Remove access platform.

1. Removal/Installation of Underwater Locating Beacon

A. Reason for the Job
Removal/installation of underwater locating beacon for replacement or inspection of battery.
NOTE : The Underwater Locator Beacon (ULB) is mounted on the front panel of the Flight Data Recorder. The unit has a self-contained battery.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Spanner Wrench (P/N 810-325 DUKANE CORP)
(2)	Access Platform 6 m (19 ft. 8 in.)
(3)	Ultrasonic Test Set (DUKANE CORP)
(4)	Stopwatch
(5)	Microammeter (100 micro A DC range)
(6)	Cleaning Agents (Ref. 20-31-00)
(7)	Pinglight Cleaning Agents (Ref. 20-31-00)

Referenced Procedures

- 31-31-00, P. Block 501	Aids Interconnection - Interface
- 31-31-35, P. Block 401	Digital Flight Data Recorder

C. Procedure
(1)Job Set-Up
(a)Position access platform at BULK cargo compartment door (Zone 813).
(b)Open BULK cargo compartment door (Zone 813).
(c)Circuit breakers: Not affected.
(2)Removal

**ON A/C 101-200,

(Ref. Fig. 401)

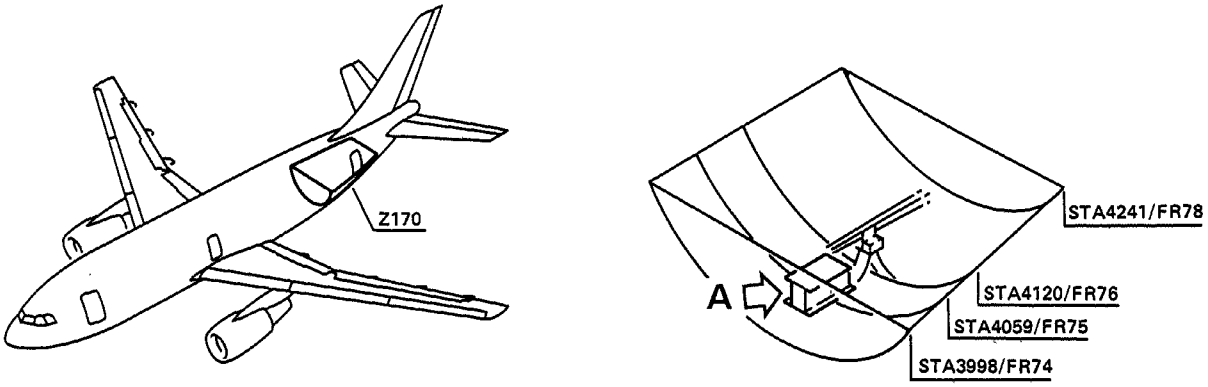
**ON A/C 001-100,

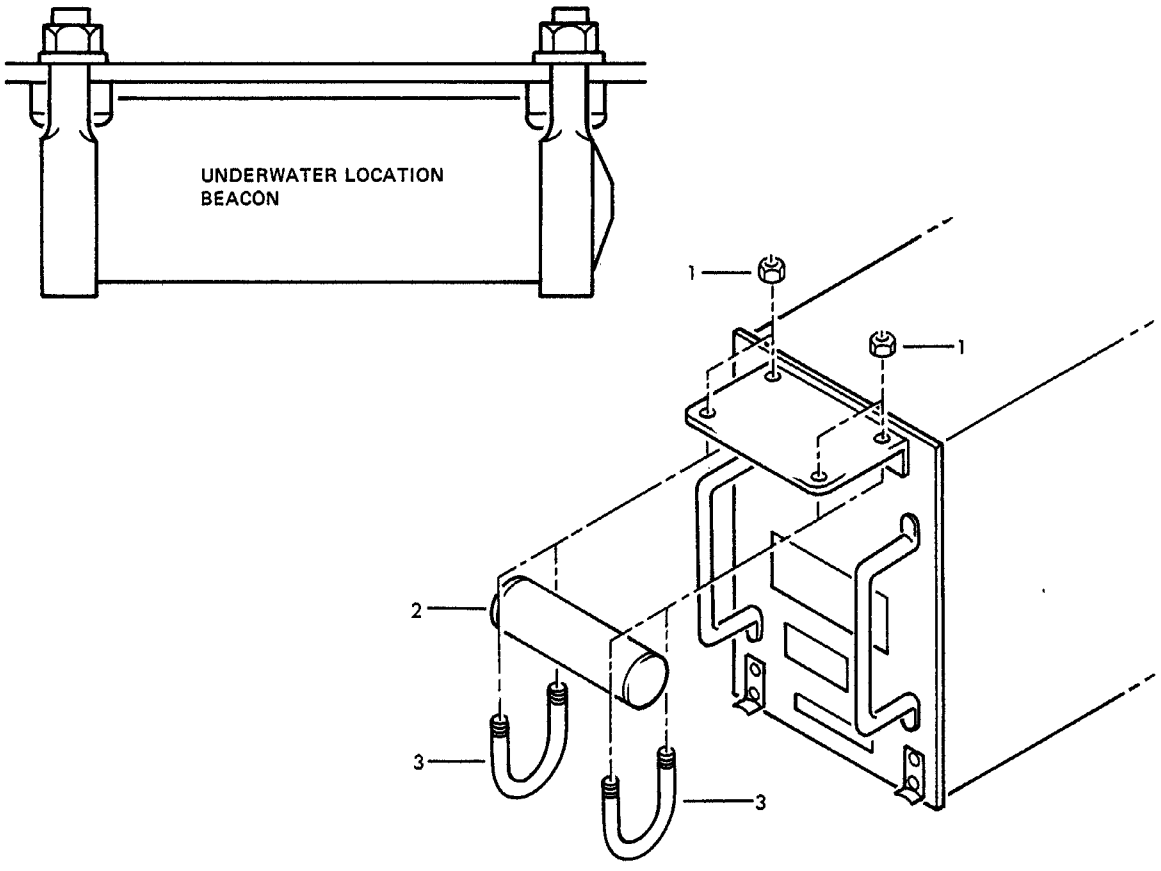
(Ref. Fig. 402)

R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

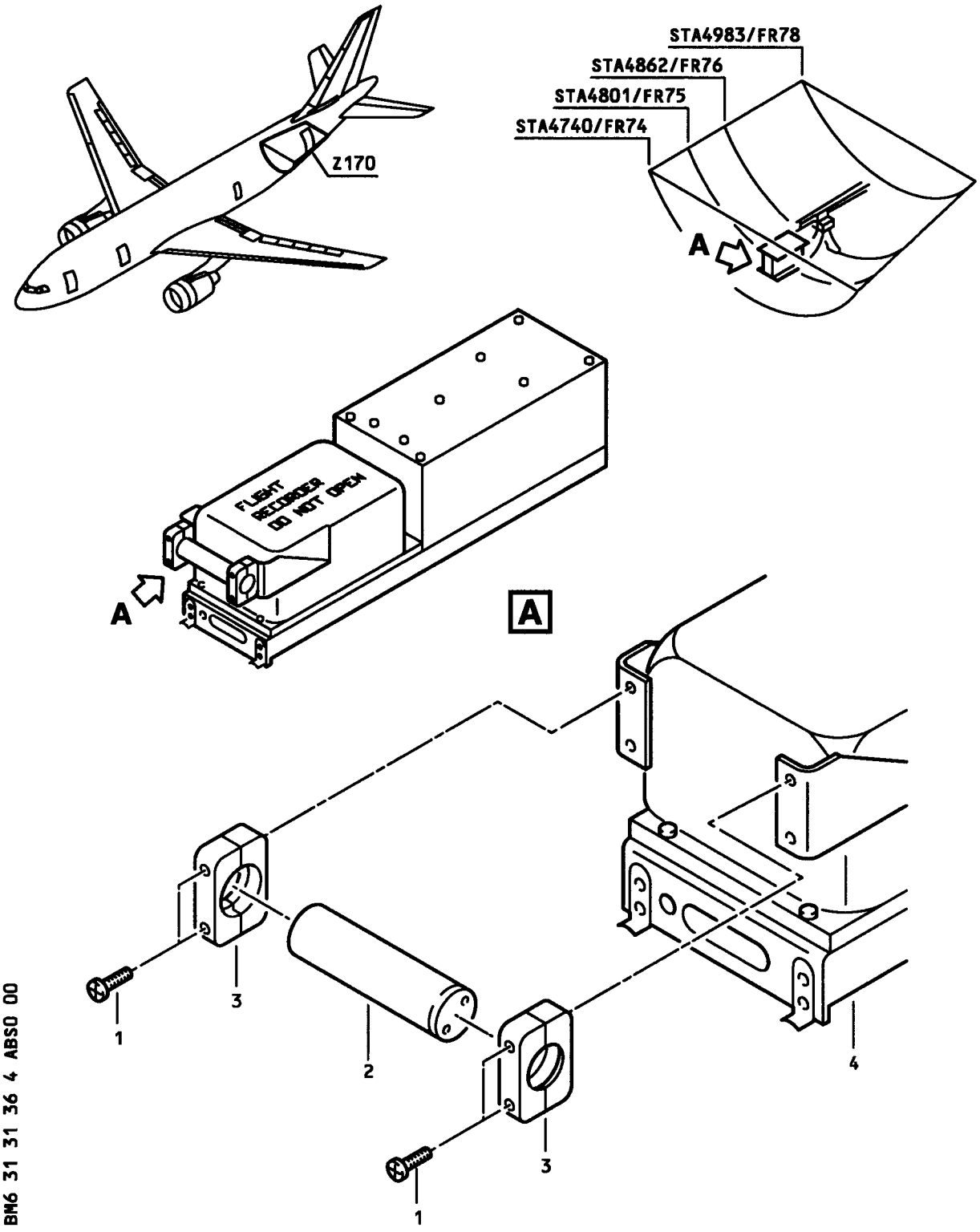
(Ref. Fig. 403)



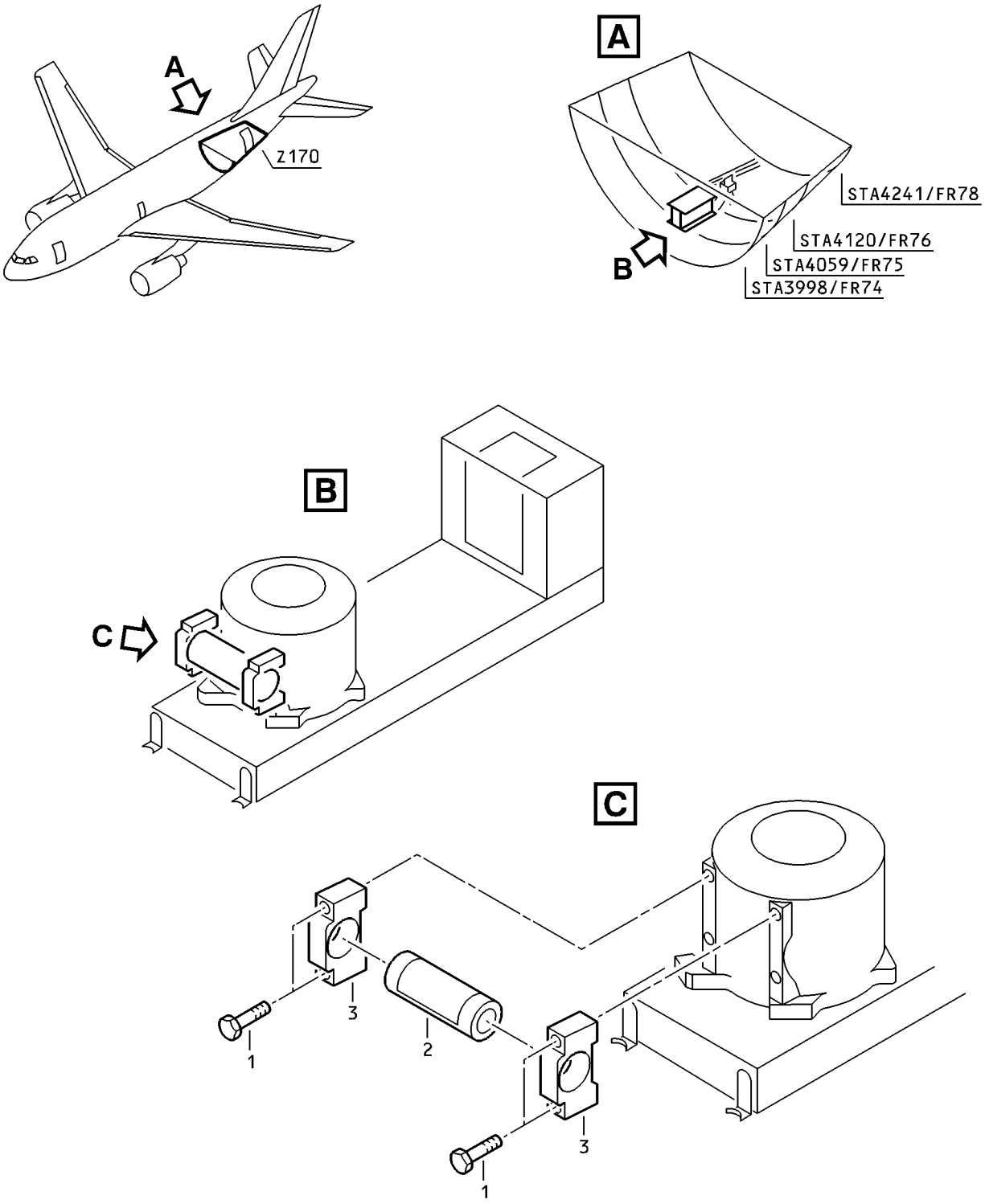


B M 6 31 31 36 4 AC P 0–25

Underwater Location Beacon - Removal/Installation
Figure 401



Underwater Location Beacon - Removal/Installation
Figure 402



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Underwater Location Beacon - Removal/Installation
Figure 403

**ON A/C ALL

(a)Unscrew mounting screws (1).
(b)Slide ULB out of retainer mounts.

**ON A/C 001-100,

(a)Remove screws (1) from beacon mount (3).

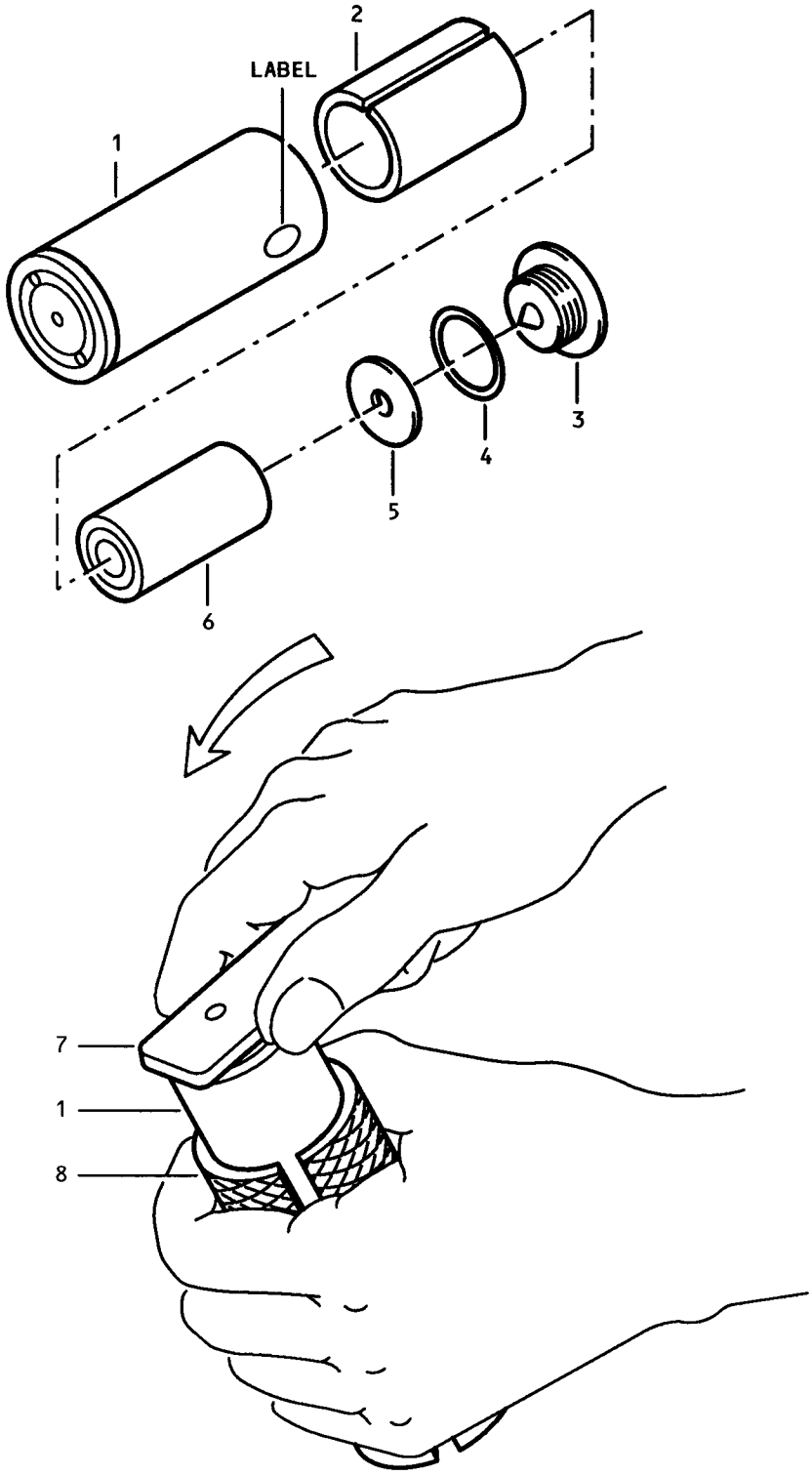
R **ON A/C 101-104,

R Post SB 31-2116 For A/C 101-104,

(a)Unscrew mounting screws (1).
(b)Slide ULB(2) out of beacon mount brackets (3).

**ON A/C ALL

(3)Battery Removal/Installation
NOTE : If the ULB is a Type DK100 send the ULB to the related vendor for replacement of battery.
(Ref. Fig. 404)
(a)Support beacon (1) by means of a split hose (8).
(b)Using wrench (7) turn end cap (3) marked BATTERY ACCESS counterclockwise. Remove O-ring (4).
(c)Remove shock cushion (5).
(d)Tap case of beacon (1) with fingers to slide out battery (6). If the shock cushion (2) comes out at the same time as the battery, replace immediately.
(e)If battery is not replaced, visually inspect battery. Check that battery contacts are clean of corrosion.
(f)If battery is replaced, affix new label indicating date of battery replacement on beacon case and cover with lacquer.
CAUTION : DO NOT AFFIX ANY LABELS, EXCEPT AS SPECIFIED ON THE BEACON BODY.
(g)Install new battery making certain that end marked INSERT THIS END is inserted first, as indicated by arrow on battery and cap.
CAUTION : INCORRECT POLARITY WILL PERMANENTLY DAMAGE THE BEACON.
WARNING : INCORRECT POLARITY CAN CAUSE THE BATTERY TO EXPLODE AND CREATE A HAZARD FOR PERSONNEL.
(h)OFF-CURRENT-TEST
Connect + probe of microammeter on the + battery and the - probe of microammeter on the body of beacon. Check for current leakage between battery and beacon body. Leakage should be less than 2 microamperes.
(j)Clean threads and slot on O-ring (4) with cleaner and lint free cloth.
(k)Apply a thin coat of lubricant to O-ring groove and threads in body of beacon.



BM6 31 31 36 4 AKA0 00

ULB Battery - Removal/Installation
Figure 404

(l)Install O-ring (4) under end cap flange (3). Install shock cushion (5) on end cap and using wrench tighten end cap clockwise into beacon body.
(m)Clean the beacon with Material No. 11-005.
CAUTION : DO NOT TIGHTEN BEACON IN A VICE OR SIMILAR TOOL. TIGHTEN END CAP SLIGHTLY NOT TO DAMAGE O-RING.

(4)Tests
NOTE : You can use the Ultrasonic Test Set or the Pinglite Test Set PL1/PL3.
(a)Job set-up
1 On test set, place INPUT SELECTOR in INT position.
2 Check correct operation of test set by jingling a bunch of keys, coins or other noise producing objects near the microphone. Place TUNING CONTROL between 35 and 40 KHz.
3 Using a flexible conductor or aquivalent, short the water switch on the beacon between the center pin and the case. Place the test set microphone as near as possible to the beacon and tune test set to obtain the best signal.
(b)Test
1 Using stopwatch, count the number of pulses in a 10-second period. Divide the number by ten to obtain the pulse repetition rate. The repetition rate must be between 0.6 and 2.
2 Pulse duration can be determined by displaying the output of the test set on an oscilloscope.
3 Operating frequency can be read on the dial by tuning the test set to the acoustic signal.
NOTE : In air, the pulse duration will be longer and the pulse repetition rate slower than during tests performed by the manufacturer. However, an accelerated or increasing repetition rate indicates an expired battery. If normal operation does not occur after installation of a new battery, beacon should be replaced.
4 Remove temporary circuit established with metal braid or flexible conductor.
(5)Installation

**ON A/C 101-200,

(Ref. Fig. 401)

**ON A/C 001-100,

(Ref. Fig. 402)

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

(Ref. Fig. 403)

**ON A/C ALL

(a)Slide ULB into retainer mounts.
(b)Rotate ULB so that battery replacement date decal can be read.
(c)Make sure that the water switch on the end of the ULB is clean.
(d)Tighten mounting screws (1) on mounts.

**ON A/C 001-100,

(a)Install underwater beacon (2) in beacon mount (3) and secure with screws (1).

**ON A/C 101-104,

Post SB 31-2116 For A/C 101-104,

(a)Slide ULB (2) into beacon mount brackets (3) with the water switch end to the left.
(b)Rotate ULB so that battery replacement date decal can be read.
(c)Make sure that the water switch on the end of the ULB is clean.
(d)Tighten mounting screws (1) on beacon mounts.

**ON A/C ALL

(6)Close-Up
(a)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(b)Close BULK cargo compartment door (Zone 813).
(c)Remove access platform.

AIDS INPUTS - DESCRIPTION AND OPERATION

1. General

The parameter set sampled by the DFDAU and recorded on the DFDR contains the basic parameters. These include the mandatory parameters and an additional part to standardize the parameter list. An appended part of DFDAU parameters contains optional parameters requested by the airline.

2. Description

A. Architecture of Inputs

The DFDAU is connected to various sensors and source systems to collect the basic, optional and expanded parameter sets. The block diagram of parameter sources shows the connections of the DFDAU to the respective sources.

Details about the connection of the source systems are shown in the inputs interconnection diagrams.

R (1)DFDAU Input Sources

R The following systems are connected to the DFDAU:

R (a)Automatic Flight System

R - FCC1, FCC2 (301CA1, 301CA2)

R - TCC1, TCC2 (301CJ1, 301CJ2 via 315CJ)

R - FCU1, (303CA)

R (b)Communication System

R - HF1 (1RE1)

R - VHF1, VHF2 (1RC1, 1RC2)

R (c)Flight Control System

R - slats and flaps position instrumentation units (3CN, 4CN)

R - speed brake lever (7CS)

R - ground spoiler arm switch (41CS)

R - blue, green, yellow Hyd. System Sensor (29WW, 30WW, 31WW)

R - pitch trim wheel synchro (41WW)

R (d)Ice and Rain Protection System

R - LH, RH, normal, alternate wing anti-ice valves (37DM, 38DM, 87DM, 88DM)

R - cowl. anti-ice valves eng. 1, eng. 2

R - cowl. anti-ice switches eng. 1, eng. 2

R - start valves eng. 1, eng. 2

R (e)Independent Instruments System

R - SFCC (21CV)

R - GMT clock copilot (2FS)

R - CGCC (1GU)

R - SDAC (1WV)

R - GPWS (1WZ)

R - GPWS indicators and test switches (3WZ, 4WZ)

R - AIDS accelerometer (6TU) and identification plug (1884VC)

R - rudder pedal position (74TU)

R - FWC1 (1WW1)

R - ECAM Copilot (5WT)

R - DU Warn, DU System (1WT, 3WT)

R - SGU1/ECAM (9WT1)

R - AC BUS 1 warn relay (29XN)
R (f)Landing Gear System
R - landing gear relays (58GB, 101GB, 117GB)
R - proximity switches via annunciators (165GB, 167GB, 169GB)
R - landing gear control lever (2GA)
R - brake system control unit (29GG)
R - brake valve pressure (71GG)
R (g)Navigation System
R - FMC1, FMC2 (1CK1, 1CK2)
R - ADC1 (1FL1)
R - FNSG 1/3 switched (28FN1/28FN3 via 41FN, 34WW
R - ILS1, ILS2 (1RT1, 1RT2)
R - radio altimeter (1SA1)
R - VOR1, VOR2 (301RS1, 301RS2)
R - IRS 1/3 switched (301FP1/301FP3 via 76TU)
R - DME1, DME2 (1SD1, 1SD2)
R - FNCP1, FNCP2 (42FN1, 42FN2)
R - TCAS (1SG)
R (h)Engine Fuel and Control System
R - fuel flow indicators (4QD, 5QD)
R - EEC1 and EEC2 units
R - FQI (15QT)
R - fuel shutoff valve eng. 1, eng. 2 (18KC, 19KC)
R (j)Engine Indicating System
R - SCU1 and SCU2 units
R - N1 indicators eng. 1, eng. 2 (5EJ, 6EJ)
R (k)Exhaust System
R - reverser switches via REV UNLK annunciators (9KM, 10KM)
R - reverser microswitches via REV annunciators (11KM, 12KM)
R Details about the connection of the source systems are shown in the
R inputs interconnection diagrams.
R (2)Power Supply of Input Sources
R The DFDAU is connected to the 115 V AC essential busbar. From DFDAU the
R LA is supplied directly with 28 V DC.
R All parameter source systems are supplied by their own system power
R supplies, with the exception of:
R - the power supply of the pullup resistors (70TU, 71TU) for the fuel
R shutoff parameters from 28 V DC normal busbar 111PP via circuit
R breaker 12TU.
R - the power supply of the pullup resistor (72TU) for the landing gear
R control lever parameter from 28 V DC normal busbar 111PP via circuit
R breaker 12TU.
R - the power supply of the IRS output switching relay (76TU) from 28 V DC
R normal busbar 111PP via circuit breaker 12TU.
R - the power supply of the pullup resistors (78TU, 79TU) for the reverser
R annunciator from 28 V DC essential busbar 306PP via circuit breaker
R 5RK.
R - the power supply of the pullup resistors (80TU, 81TU) for the start
R valve from 28 V DC essential busbar 306PP via circuit breaker 5RK.
R - the power supply of the pullup resistors (82TU, 83TU) for the GPWS
R warn parameters from 28 V DC normal busbar 111PP via circuit breaker

R 12TU.

B. Parameters

The parameters processed in the **DFDAU** are listed in the separate parameter list. This description includes information about the source, input characteristics, input connector pin assignment and output characteristic of the parameters.

For parameters which need a more detailed description about linearity, signal levels or accuracy a separate detailed description of the parameters, is attached.

The **DFDAU** is capable of recognizing its location on different aircraft type by decoding the **IDENT DISCRETES**. The assignment of these 18 discretes is specified in Table 1.

Each of these pins will be coded by being either 'open' or connected to the identification common pin **(AD 11K)**. The connection to identification common will indicate the 'one' state.

Table 1 Identification Coding:

PIN CODING FOR CONNECTOR AD																			
A/C TYPE IDENT						FLEET IDENT		A/C No. IDENT										A/C No.	REGISTR
9F	9E	9D	9C	9B	9A	9K	9J	9H	9G	11H	11G	11F	11E	11D	11C	11B	11A		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	650/001	
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	674/002	
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	676/003	
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	678/004	
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	0		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1		
0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0		

(1)Parameter List

The parameter list contains all necessary data to describe the main characteristics of the parameters. The list for the **DFDAMU/DFDAU** parameters includes:

- the parameter number
- the name of the parameter

with the input characteristics of:

- the signal type or the label, **SDI** and **EQ**
- the range
- the accuracy
- the sign bit, data bits, **UPD**/s and code
- the connector pin assignment

and the output characteristics of

- the location in the **DFDR** and **QAR** frame
- the **ARINC 429** label, **SDI**, data **MSB** and **LSB**, **UPD**/s and code

R (a)Parameter Number
R The numbers of the mandatory and the recommended parameters consists
R of 3 parts:
R Part 1: ''M'' for mandatory parameters according to Eurocae ED55.
R ''R'' for recommended parameters according to Eurocae ED55.
R Part 2: ''Serial No.'' according to Eurocae ED55.
R Part 3: Continuous number
R example: M (1) 1A (2) 01 (3) TIME GMT - HOURS
R Remarks used in the parameter list dependent on different parameters
R are described in front of the list.
R The numerical numbers in brackets < > are reference numbers defined
R in previous AIDS specification. The numbers of the optional parameters
R are numerical only.
R (b)Name of the Parameter
R The name of the parameter is a short concise interpretation of the
R functional identification and is identical to the name defined in
R the system specification.
R (c)Signal Type or Label, SDI and EQ
R The signal type of the parameters is listed, except the parameter
R transmitted via a serial ARINC 429 bus. In this case the label, SDI
R and equipment identification code (EQ) are listed for an explicit
R identification of the DITS parameters.
R The SDI (or system number) together with the EQ also determines the
R input port of the data bus. This port number is used in the DFDAMU/
R DFDAU software routines.
R (d)Range
R The listed values describe the operational range of the parameter. This
R is the range in which the parameter is normally working. For some ARINC
R 429 parameters the digital word range is listed. This is marked by a
R 'W' in front of the values. The word range is the range which can be
R transmitted in this data word. The values of the parameter must not
R necessarily use the whole range.
R For discrete bit information received via the ARINC 429 bus the respec-
R tive bit position in the ARINC 429 word is mentioned.

R (e) Accuracy
R The listed accuracy is the overall accuracy including the conversion
R error of the DFDAMU acquisition part.
R For some ARINC 429 parameters the resolution is listed. This is
R marked by a 'R' in front of the values.
R (f) Sign Bit, Data Bits, UPD/s and Code
R These columns are only valid for data received via the ARINC 429 bus.
R The sign bit column shows the position of the sign bit in the received
R ARINC 429 word if the sign bit is used.
R For the mentioned data bits the most significant bit (MSB) is defined
R as bit number 28 of the ARINC 429 word.
R The listed update per second (UPS/s) is the average number of trans-
R missions per second of this parameter to the DFDAMU/DFDAU.
R In the column code the type of coding of the received data is
R mentioned. If the ARINC 429 word is neither defined as BNR nor as BCD,
R the word is a discrete or special coded type.
R (g) Input Connector Pin Assignment
R The listed pin assignment identifies the insert and the pin in rela-
R tion to the ARINC 717 Standards.
R Table 2 shows the ARINC 717 Standards which define the method of the
R connection of the different sort of inputs for the DFDAMU/DFDAU. This
R standardization allows the use of a general type of input port for all
R analog signals and to define by software how to handle the respective
R input signal.
R (h) DFDR Data Frame Location
R To find the location of the parameter on the DFDR data frame the word,
R subframe and number of bits (bit position for discretes) is listed for
R each recorded parameter. The bit position for discretes is written in
R brackets.
R (j) Output Label, SDI, Data MSB and LSB, UPD/s and Code
R The parameters are sent out on an ARINC 429 output bus. The defined
R label, SDI and data bits for MSB and LSB, as well as update per second
R (UPD/s) on this bus are mentioned in the respective columns.

R Table 2 Input Connector Pin Assignment Standards

Type of Input	Connector Pin			
	a	b	c	d
Synchro	X	Z	Y	OPEN
AC Voltage Ratio 1	H	C	R	OPEN
AC Voltage Ratio 2	H	C	R	OPEN
DC Voltage	H	C	OPEN	OPEN
DC Voltage Ratio	H	C	R	OPEN
Potentiometer	H	C	OPEN	OPEN
Resistance Probe	H	C	OPEN	EXC.
DITS PORT	A	B	OPEN	OPEN
Discrete	NO LEAD DESIGNATION			

R Following remarks are used in the DFDAU parameter list for:
R mandatory parameters
R - (1)Recording of a '0' if VHF or HF keying are in send mode
R - (2)Bit 24 to 14 of the ARINC 429 word
R - (3)Bit 29, 27 to 24 of the ARINC 429 word
R - (4)Accuracy at 10.000 ft. For further values see ADC specification
R - (5)Parameter used engine General Electric
R - (6)Parameter used engine Pratt & Whitney 7T9D-7R4
R - (7)Parameter used for engine Pratt & Whitney 4000
R - (8)Definition for A310-200 and A310-300
R - (9)Definition for A300-600 and A300-600R
R -(10)Recording of a '1' if one or more of these bits have state 1
R recommended parameters
R - (1)Parameter source is FMC1 if FCC1 or FMC2 if FCC2 is selected
R - (2)Bit 20 to 10 of the ARINC word
R - (3)Bit 29, 27 to 21 of the ARINC word
R - (4)Bit 21 to 11 of the ARINC word
R - (5)Bit 29 to 22 of the ARINC word
R - (6)IRS Smith
R - (7)IRS Honeywell
R - (8)Parameter used for engine General Electric
R - (9)Parameter used for engine Pratt & Whitney JT9D-7R4
R -(10)Parameter used for engine Pratt & Whitney 4000
R -(11)Significant data digits
R -(12)Bit 22 to 15 of the ARINC word
R -(13)Bit 29 to 23 of the ARINC word
R -(14)Bit 17 to 11 of the ARINC word
R -(15)Bit 22 to 15 of the ARINC word
R -(16)Bit 28 to 21 of the ARINC word
R -(17)Word range is 108.00 to 111.95 MHz because the most significant
R digit is added by the receiver
R optional parameters
R -(1)for A310-300 and A300-600R only
R -(2)Parameter used for engine Pratt & Whitney JT9D-7R4

R -(3)Definition for A310-200 and A310-300
R -(4)Parameter used for General Electric
R -(9)peak to peak

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE / LABEL (NO.SDI EQ)	SIGN BIT	DATA BITS	UPD/SEC
31	M01A01 <98>	TIME GMT - HOURS ô >	150 00 31		17	7.5
31	M01A02 <99>	TIME GMT - MIN,SEC /				
31	M01B01 <282>	FRAME COUNTER				
34	M02.01 <1>	ALT (1013 mb) FINE ô (2) >	203 XX 25	29	17	5
34	M02.02 <2>	ALT (1013 mb) COARSE / (3)				
34	M03.01 <4>	COMPUTED AIRSPEED	206 XX 25		14	5
34	M04.01 <6>	MAGNETIC HEADING	320 XX 25	29	10	10
31	M05.01 <9>	BODY NORMAL ACCEL	LLDC 0-5V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M01A01			41	0004	5	
<98>	0 to 23h59'59"	1.0"				
M01A02			50	0030	12	
<99>						
M01B01	4096		56	0004	12	
<282>						
M02.01			58	1234	11	
<1>	W +/- 131 072 ft	R 1 ft				
M02.02	-2000 to +51 000 ft	+/- 20 ft (4)	57	0004	5	
<2>						
M03.01	W 1024 Kts	R 0.0625 Kts	10	1234	9	
<4>	30 to 450 Kts	+/- 5 Kts				
M04.01	W +/- 180 Deg	R 0.175 Deg	09	1234	10	
<6>	+/- 180 Deg	+/- 3 Deg				
M05.01	- 3 g to + 6 g	+/- 0.04 g	04	1234	12	
<9>			12	1234	12	
			20	1234	12	
			28	1234	12	
			36	1234	12	
			44	1234	12	
			52	1234	12	
			60	1234	12	

	DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER		SIGNAL TYPE < LABEL (NO.SDI EQ)>	SIGN BIT	DATA BITS	UPD/ SEC
34	M06.01 <7>	PITCH ANGLE		324 XX 25	29	10	20
34	M07.01 <8>	ROLL ANGLE		325 XX 25	29	10	20
23	M08.01 <38>	VHF 1		OPEN/OV-Sh			
23	M08.02 <39>	VHF 2		OPEN/OV-Sh			
23	M08.03 <43>	VHF 3		OPEN/OV-Sh			
23	M08.04 <44>	HF 1		OPEN/OV-Sh			
23	M08.05 <45>	HF 2		OPEN/OV-Sh			

R DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M06.01 <7>	W +/- 180 Deg +/- 90 Deg	R 0.175 Deg +/- 0.2 Deg	13 29 45 61	1234 1234 1234 1234	9 9 9 9	
M07.01 <8>	W +/- 180 Deg +/- 180 Deg	R 0.175 Deg +/- 0.2 Deg	14 46	1234 1234	10 10	
M08.01 <38>	bit status 0 in send mode (1)		09	1234	(1)	
M08.02 <39>	bit status 0 in send mode (1)		09	1234	(1)	
M08.03 <43>	bit status 0 in send mode (1)		09	1234	(1)	
M08.04 <44>	bit status 0 in send mode (1)		09	1234	(2)	
M08.05 <45>	bit status 0 in send mode (1)		09	1234	(2)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	M09A01 <30>	N1 ACTUAL ENG 1 (5)	346 01 1A		12	8
77	M09A02 <31>	N1 ACTUAL ENG 2 (5)	346 10 1A		12	8
76	M09B01 <150>	TRUST LEV ANGLE ENG 1 (5)	133 01 1A		12	4
76	M09B02 <151>	TRUST LEV ANGLE ENG 2 (5)	133 10 1A		12	4

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M09A01 <30>	W 256 % rpm 15 to 125 % rpm	R 0.0625 % rpm +/-0.25 % rpm	8	1234	9	
M09A02 <31>	W 256 % rpm 15 to 125 % rpm	R 0.0625 % rpm +/-0.25 % rpm	40	1234	9	
M09B01 <150>	W +/- 512 Deg 15 to 87.5 Deg	R 0.125 Deg +/- 0.5 Deg	16	1234	6	
M09B02 <151>	W +/- 512 Deg 15 to 87.5 Deg	R 0.125 Deg +/- 0.5 Deg	16	1234	6	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	M09A01 <30>	EPR ACTUAL ENG 1 (6)	340 10 1A		12	10
77	M09A02 <31>	EPR ACTUAL ENG 2 (6)	340 01 1A		12	10
76	M09B01 <150>	POWER LEVER ANGLE ENG 1 (6)	133 10 1A	29	12	10
76	M09B02 <151>	POWER LEVER ANGLE ENG 2 (6)	133 01 1A	29	12	10

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M09A01 <30>	W 4.00 0.5 to 1.97	R 0.000977 +/- 0.0049	8	1234	9	
M09A02 <31>	W 4.00 0.5 to 1.97	R 0.000977 +/- 0.0049	40	1234	9	
M09B01 <150>	W +/- 180 Deg - 8.9 to 135.81 Deg	R 0.044 Deg +/- 0.2 Deg	16	1234	6	
M09B02 <151>	W +/- 180 Deg - 8.9 to 135.81 Deg	R 0.044 Deg +/- 0.2 Deg	16	1234	6	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
77	M09A01 <30>	EPR ACTUAL ENG 1 (7)	340 00 1A		13	20
77	M09A02 <31>	EPR ACTUAL ENG 2 (7)	340 00 1A		13	20
76	M09B01 <150>	THROTTLE RESOLVER ANGLE (7) (TRA) ENG 1	133 00 1A		12	5
76	M09B02 <151>	THROTTLE RESOLVER ANGLE (7) (TRA) ENG 2	133 00 1A		12	5

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M09A01	W 4.00	R 0.0005	8	1234	9	
<30>	0.5 to 2.20	+/- 0.0045				
M09A02	W 4.00	R 0.0005	40	1234	9	
<31>	0.5 to 2.20	+/- 0.0045				
M09B01	W +/- 180 Deg	R 0.044 Deg	16	1234	6	
<150>	0 to 90 Deg	+/-0.167 Deg				
M09B02	W +/- 180 Deg	R 0.044 Deg	16	1234	6	
<151>	0 to 90 Deg	+/-0.167 Deg				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
27	M10.01 <20>	FLAPS POSITION	SYNCHRO			
27	M11.01 <21>	SLATS POSITION	SYNCHRO			
78	M12.01 <25>	REVERSER IN POS ENG 1	28V/0V			
78	M12.02 <27>	REVERSER IN POS ENG 2	28V/0V			
78	M12.03 <24>	REVERSER UNLOCK ENG 1	OPEN/0V-Sh			
78	M12.04 <26>	REVERSER UNLOCK ENG 2	OPEN/0V-Sh			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
	0 to 41 Deg (8)					
M10.01 <20>	0 to 33.5 Deg (9)	+/- 1 Deg	19	0204	8	
M11.01 <21>	0 to 25 Deg	+/- 1 Deg	17	1234	8	
M12.01 <25>	bit status 0 (OV)		21	1234	(2)	
M12.02 <27>	bit status 0 (OV)		22	1234	(2)	
M12.03 <24>	bit status 0 (OV)		21	1234	(1)	
M12.04 <26>	bit status 0 (OV)		22	1234	(1)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL > <NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
27	M13.01 <116>	SPOILER 1 LH RET	146 00 29		#11	4
27	M13.02 <117>	SPOILER 2 LH RET	146 00 29		#13	4
27	M13.03 <118>	SPOILER 3 LH RET	146 00 29		#15	4
27	M13.04 <119>	SPOILER 4 LH RET	146 00 29		#17	4
27	M13.05 <120>	SPOILER 5 LH RET	146 00 29		#19	4
27	M13.06 <121>	SPOILER 6 LH RET	146 00 29		#21	4
27	M13.07 <122>	SPOILER 7 LH RET	146 00 29		#23	4
27	M13.08 <123>	SPOILER 1 RH RET	146 00 29		#12	4
27	M13.09 <124>	SPOILER 2 RH RET	146 00 29		#14	4
27	M13.10 <125>	SPOILER 3 RH RET	146 00 29		#16	4
27	M13.11 <126>	SPOILER 4 RH RET	146 00 29		#18	4
27	M13.12 <127>	SPOILER 5 RH RET	146 00 29		#20	4
27	M13.13 <128>	SPOILER 6 RH RET	146 00 29		#22	4
27	M13.14 <129>	SPOILER 7 RH RET	146 00 29		#24	4

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M13.01 <116>	bit status 1		29	1234	(1)	
M13.02 <117>	bit status 1		29	1234	(2)	
M13.03 <118>	bit status 1		29	1234	(3)	
M13.04 <119>	bit status 1		10	1234	(1)	
M13.05 <120>	bit status 1		10	1234	(2)	
M13.06 <121>	bit status 1		10	1234	(3)	
M13.07 <122>	bit status 1		8	1234	(1)	
M13.08 <123>	bit status 1		8	1234	(2)	
M13.09 <124>	bit status 1		8	1234	(3)	
M13.10 <125>	bit status 1		13	1234	(1)	
M13.11 <126>	bit status 1		13	1234	(2)	
M13.12 <127>	bit status 1		13	1234	(3)	
M13.13 <128>	bit status 1		14	1234	(1)	
M13.14 <129>	bit status 1		14	1234	(2)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
27	M13.15 <160>	SPOILER 1+4 FAULT/OFF	126 01 26		#13	7-25
27	M13.16 <161>	SPOILER 3+2 FAULT/OFF	126 01 26		#14	7-25
27	M13.17 <162>	SPOILER 5 FAULT/OFF	126 01 26		#15	7-25
27	M13.18 <163>	SPOILER 6 FAULT/OFF	126 01 26		#16	7-25
27	M13.19 <164>	SPOILER 7 FAULT/OFF	126 01 26		#17	7-25
27	M13.20 <286>	GROUND SPOILER NOT ARMED	28V/OPEN			
27	M13.21 <287>	SPEED BRAKE HANDLE	Pot			
34	M14.01 <101>	TAT	211 XX 25	29	11	5

DFDAU PARAMETER LIST (PART 1)

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M13.15 <160>	bit status 1		45	1234	(1)	
M13.16 <161>	bit status 1		45	1234	(2)	
M13.17 <162>	bit status 1		45	1234	(3)	
M13.18 <163>	bit status 1		46	1234	(1)	
M13.19 <164>	bit status 1		46	1234	(2)	
M13.20 <286>	bit status 1 (28V)		39	1234	(1)	
M13.21 <287>	0 to 50 Deg	+/- 0.5 %	24	1234	6	
M14.01 <101>	W +/- 512 Deg C - 60 to + 99 Deg C	R 0.25 Deg C +/- 0.2 Deg C	51	0204	10	

ATA	NO	PARAMETER		INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ >	SIGN BIT	DATA BITS	UPD/ SEC
22	M15A01 <32>	A/P CMD #1		146 XX 01		#12	16
22	M15A02 <33>	A/P CWS #1		146 XX 01		#11	16
22	M15A03 <2567>	FD #1		146 XX 01		#13	16
22	M15A04 <35>	A/P CMD #2		146 XX 01		#12	16
22	M15A05 <36>	A/P CWS #2		146 XX 01		#11	16
22	M15A06 <2667>	FD #2		146 XX 01		#13	16
22	M15A07 <75>	ô > ALTITUDE ACQ	(1)	274 XX 01		2	16
22	M15A08 <85>	/		274 XX 01			
22	M15A09 <78>	ô > A/P ALT HOLD	(1)	274 XX 01		2	16
22	M15A10 <88>	/		274 XX 01			
22	M15A11 <76>	ô > G/S CAPTURE	(1)	274 XX 01		2	16
22	M15A12 <86>	/		274 XX 01			
22	M15A13 <173>	ô > G/S TRK	(1)	274 XX 01		2	16
22	M15A14 <174>	/		274 XX 01			
22	M15A15 <175>	ô > SPD CLIMB	(1)	274 XX 01		3	16
22	M15A16 <176>	/		274 XX 01			
22	M15A17 <177>	ô > SPD DESCENT	(1)	274 XX 01		3	16
22	M15A18 <178>	/		274 XX 01			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15A01 <32>	bit status 1		03	1234	(1)	
M15A02 <33>	bit status 1		03	1234	(2)	
M15A03 <2567>	bit status 1		03	1234	(3)	
M15A04 <35>	bit status 1		35	1234	(1)	
M15A05 <36>	bit status 1		35	1234	(2)	
M15A06 <2667>	bit status 1		35	1234	(3)	
M15A07 <75>	ô > bit 13 and 29		17	1234	4	
M15A08 <85>	/					
M15A09 <78>	ô > bit 13 and 22		17	1234	4	
M15A10 <88>	/					
M15A11 <76>	ô > bit 19 and 29		17	1234	4	
M15A12 <86>	/					
M15A13 <173>	ô > bit 19 and 22		17	1234	4	
M15A14 <174>	/					
M15A15 <175>	ô bit 10 > and 11		17	1234	4	
M15A16 <176>	/ and not 12					
M15A17 <177>	ô bit 9 > and 11		17	1234	4	
M15A18 <178>	/ and not 12					

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ >	SIGN BIT	DATA BITS	UPD/ SEC
		DFDAU PARAMETER LIST (PART 1)				
22	M15A19 <179>	ô > MACH CLIMB	274 XX 01		3	16
22	M15A20 <180>	/	274 XX 01			
22	M15A21 <181>	ô > MACH DESCENT	274 XX 01		3	16
22	M15A22 <182>	/	274 XX 01			
22	M15A23 <183>	ô > PROFILE ALT	274 XX 01		3	16
22	M15A24 <184>	/	274 XX 01			
22	M15A25 <185>	ô > PROFILE CLIMB	274 xx 01		2	16
22	M15A26 <186>	/	274 xx 01			
22	M15A27 <187>	ô > PROFILE DESCENT	274 xx 01		2	16
22	M15A28 <188>	/	274 xx 01			
22	M15A29 <189>	ô > PROFILE SPEED PHASE	274 xx 01		2	16
22	M15A30 <190>	/	274 xx 01			
22	M15A31 <191>	ô > PROFILE MACH PHASE	274 xx 01		2	16
22	M15A32 <192>	/	274 xx 01			
22	M15A33 <2526>	ô > VERTICAL SPEED	274 xx 01		#14	16
22	M15A34 <2626>	/	274 xx 01			
22	M15A35 <2529>	ô > PITCH TAKE OFF	274 xx 01		#17	16
22	M15A36 <2629>	/	274 xx 01			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15A19	ô bit 10					
<179>	> and 18		17	1234	4	
M15A20	/ and not 12					
<180>						
M15A21	ô bit 9					
<181>	> and 18		17	1234	4	
M15A22	/ and not 12					
<182>						
M15A23	ô bit 12					
<183>	> and not 9		17	1234	4	
M15A24	/ and not 10					
<184>						
M15A25	ô					
<185>	> bit 12 and 10		17	1234	4	
M15A26	/					
<186>						
M15A27	ô					
<187>	> bit 12 and 9		17	1234	4	
M15A28	/					
M15A29						
<189>	ô		17	1234	4	
M15A30	> bit 11 and 12					
<190>	/					
M15A31						
<191>	ô		17	1234	4	
M15A32	> bit 18 and 12					
<192>	/					
M15A33						
<2526>	ô		17	1234	4	
M15A34	>bit status 1					
<2626>	/					
M15A35						
<2529>	ô		17	1234	4	
M15A36	> bit ststus 1					
<2629>	/					

ATA	NO	PARAMETER	DFDAU PARAMETER LIST (PART 1) INPUT CHARACTERISTICS: SIGNAL TYPE <NO.SDI EQ>	LABEL	SIGN BIT	DATA BITS	UPD/ SEC
22	M15A37 <193>	ô > NAV MODE	275 xx 01			2	16
22	M15A38 <194>	/	275 xx 01				
22	M15A39 <195>	ô > LOC CAPT MODE	275 xx 01			2	16
22	M15A40 <196>	/	275 xx 01				
22	M15A41 <197>	ô > LOC TRK MODE	275 xx 01			2	16
22	M15A42 <198>	/	275 xx 01				
22	M15A43 <218>	ô > VOR CAPT MODE	275 xx 01			2	16
22	M15A44 <219>	/	275 xx 01				
22	M15A45 <220>	ô > VOR TRK MODE	275 xx 01			2	16
22	M15A46 <221>	/	275 xx 01				
22	M15A47 <2545>	ô > HDG MODE	275 xx 01			#12	16
22	M15A48 <2645>	/	275 xx 01				
22	M15A49 <61>	ô > HDG SEL	275 xx 01			#13	16
22	M15A50 <83>	/	275 xx 01				
22	M15A51 <2550>	ô > YAW TAKE OFF MODE	275 xx 01			#17	16
22	M15A52 <2650>	/	275 xx 01				
22	M15A53 <2551>	ô > ROLL GA MODE	275 xx 01			#18	16
22	M15A54 <2651>	/	275 xx 01				

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15A37 <193>	ô > bit 11 and 23 /		19	1234	4	
M15A38 <194>						
M15A39 <195>	ô > bit 15 and 21 /		19	1234	4	
M15A40 <196>						
M15A41 <197>	ô > bit 15 and 23 /		19	1234	4	
M15A42 <198>						
M15A43 <218>	ô > bit 22 and 21 /		19	1234	4	
M15A44 <219>						
M15A45 <220>	ô > bit 22 and 23 /		19	1234	4	
M15A46 <221>						
M15A47 <2545>	ô > bit status 1 /		19	1234	4	
M15A48 <2645>						
M15A49 <61>	ô > bit status 1 /		19	1234	4	
M15A50 <83>						
M15A51 <2550>	ô > bit status 1 /		23	1234	1	
M15A52 <2650>						
M15A53 <2551>	ô > bit status 1 /		19	1234	4	
M15A54 <2651>						

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
22	M15A55 <2549>	ô > ROLL OUT MODE	275 xx 01		#16	16
22	M15A56 <2649>	/	275 xx 01			
22	M15A57 <2528>	ô > PITCH GA MODE	274 xx 01		#16	16
22	M15A58 <2628>	/	274 xx 01			
22	M15A59 <2527>	ô > FLARE	274 xx 01		#15	16
22	M15A60 <2627>	/	274 xx 01			
22	M15A61 <34>	ô > LAND TRK	146 xx 01		#14	16
22	M15A62 <37>	/	146 xx 01			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15A55 <2549>	ô > bit status 1 /		19	1234	4	
M15A56 <2649>						
M15A57 <2528>	ô > bit status 1 /		23	1234	2	
M15A58 <2628>						
M15A59 <2527>	ô > bit status 1 /		19	1234	4	
M15A60 <2627>						
M15A61 <34>	ô > bit status 1 /		31	1234	(1)	
M15A62 <37>						

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE / LABEL / NO. SDI EQ	SIGN BIT	DATA BITS	UPD/SEC
22	M15B01 <2400>	ATS ARMING LEVER OFF	274 XX 03		#11	16
22	M15B02 <2403>	MANUAL THROTTLE ARMD	274 XX 03		#12	16
22	M15B03 <72>	AUTOTHROTTLE MODE ENGD	274 XX 03		#13	16
22	M15B04 <222>	ATS CLUTCHES OFF (TAKE OFF)	274 XX 03		#16	16
22	M15B05 <224>	VNAV MODE - PROFILE ENGD	274 XX 03		#17	16
22	M15B06 <226>	A/THR THRUST N 1 MODE ENGD (2)	274 XX 03		#18	16
22	M15B07 <71>	A/THR THRUST EPR MODE ENGAGED (3)	274 XX 03		#19	16
22	M15B08 <70>	MACH MODE ENGAGED	274 XX 03		#20	16
22	M15B09 <69>	SPEED MODE ENGAGED	274 XX 03		#21	16
22	M15B10 <73>	RETARD MODE ENGAGED	274 XX 03		#22	16
22	M15B11 <228>	ALPHA FLOOR MODE ENGAGED	274 XX 03		#28	16

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15B01 <2400>	bit status 1		31	1234	(2)	
M15B02 <2403>	bit status 1		30	1234	(1)	
M15B03 <72>	bit status 1		30	1234	(2)	
M15B04 <222>	bit status 1		37	1234	(1)	
M15B05 <224>	bit status 1		37	1234	(2)	
M15B16 <226>	bit status 1		38	1234	(1)	
M15B17 <71>	bit status 1		38	1234	(1)	
M15B18 <70>	bit status 1		38	1234	(2)	
M15B19 <69>	bit status 1		40	1234	(1)	
M15B20 <73>	bit status 1		40	1234	(2)	
M15B21 <228>	bit status 1		40	1234	(3)	

	DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER		SIGNAL TYPE < LABEL <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
31	M16.01 <11>	BODY LONG ACCEL		LLDC 0-5V			
31	M17.01 <10>	BODY LATERAL ACCEL		LLDC 0-5V			
27	M18A01 <16>	ELEVATOR POSITION		314 00 29	29	11	8
27	M18B01 <18>	ALL SPEED AILERON LH		310 01 29	29	11	8
27	M18B02 <19>	ALL SPEED AILERON RH		310 10 29	29	11	8
27	M18C01 <17>	RUDDER POSITION		312 00 29	29	11	8
27	M19.01 <15>	STABILIZER POSITION		315 00 29	29	11	8
34	M20.01 <5>	RADIO HEIGHT RA 1		164 01 07	29	16	25
34	M20.02 <97>	RADIO HEIGHT RA 2		164 XX 25	29	13	6
34	M21A01 <12>	GLIDE SLOPE DEVIATION 1		174 XX 10	29	12	16
34	M21A02 <861>	GLIDE SLOPE DEVIATION 2		174 XX 10	29	12	16

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M16.01			5	1234	10	
<11>	+/- 1 g	+/- 0.01g	21	1234	10	
			37	1234	10	
			53	1234	10	
M17.01			6	1234	10	
<10>	+/- 1 g	+/- 0.01 g	22	1234	10	
			38	1234	10	
			54	1234	10	
M18A01			7	1234	10	
<16>	W +/- 180 Deg	R 0.0879 Deg	23	1234	10	
	+ 30 to -15 Deg	+/- 1 Deg	39	1234	10	
			55	1234	10	
M18B01			15	1234	10	
<18>	W +/- 180 Deg	R 0.0879 Deg	47	1234	10	
	+/- 23 Deg	+/- 1 Deg				
M18B02			31	1234	10	
<19>	W +/- 180 Deg	R 0.0879 Deg	63	1234	10	
	+/- 23 Deg	+/- 1 Deg				
M18C01			30	1234	10	
<17>	W +/- 180 Deg	R 0.0879 Deg	62	1234	10	
	+/- 30 Deg	+/- 1 Deg				
M19.01			25	1234	9	
<15>	W +/- 180 Deg	R 0.0879 Deg				
	- 14 to + 2 Deg	+/- 0.25 Deg				
M20.01			11	1234	12	
<5>	W +/- 8192 ft	R 0.125 ft				
M20.02	- 20 to + 2500 ft	+/- 1.5 ft	26	0204	12	
<97>	W +/- 8192 ft	R 1 ft				
M21A01	- 20 to + 2500 ft	+/- 1.5 ft	34	1030	9	
<12>	W +/- 0.8 DDM	R 0.000195 DDM				
M21A02	+/- 0.8 DDM	+/- 0.003 DDM	34	0204	9	
<861>	W +/- 0.8 DDM	R 0.000195 DDM				
	+/- 0.8 DDM	+/- 0.003 DDM				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE / LABEL <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
34	M22A01 <13>	LOCALIZER DEVIATION 1	173 XX 10	29	12	16
34	M22A02 <860>	LOCALIZER DEVIATION 2	173 XX 10	29	12	16
34	M23.01 <40>	OUTER MARKER ô ô				
34	M23.02 <41>	MIDDLE MARKER > /	222 XX 11		3	16
34	M23.03 <42>	INNER MARKER /				
	M24.01 <52>	ENG 1 FIRE	270 01 26		#22	7-25
	M24.02 <53>	ENG 2 FIRE	270 01 26		#23	7-25
	M24.03 <54>	APU FIRE	270 01 26		#21	7-25
	M24.04 <55>	SMOKE	270 01 26		#24	7-25
	M24.05 <103>	VMO / MMO OVERSPEED	126 01 26		#22	7-25
	M24.06 <281>	STALL	126 01 26		#24	7-25
	M24.07 <252>	GEAR NOT DOWN	377 01 26		#26	7-25
	M24.08 <253>	CABIN ALTITUDE	271 01 26		#29	7-25
	M24.09 <278>	CONFIGURATION	270 01 26		#28	7-25
	M24.10 <257>	ENG 1 OIL LO PR	377 01 26		#22	7-25
	M24.11 <258>	ENG 2 OIL LO PR	377 01 26		#24	7-25
	M24.12 <299>	OVERSPEED(VFE,VLE,VMO,MMO)	271 01 26		#24	7-25
	M24.13 <168>	AFT CG	126 01 26		#18	7-25
	M24.14 <300>	LAND ASAP	272 01 26		#19	7-25

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M22A01 <13>	W +/- 0.4 DDM	R 0.000097 DDM	33	1030	10	
M22A02 <860>	W +/- 0.4 DDM	R 0.000097 DDM	33	0204	10	
M23.01 <40>	+/- 0.4 DDM	+/- 0.004 DDM				
M23.02 <41>	bit 11 or 12 or 13		34	1234	(1)	
M23.02 <42>						
M24.01 <52>	bit status 1		47	1234	(1)	
M24.02 <53>	bit status 1		47	1234	(2)	
M24.03 <54>	bit status 1		39	1234	(2)	
M24.04 <55>	bit status 1		53	1234	(1)	
M24.05 <103>	bit status 1		53	1234	(2)	
M24.06 <281>	bit status 1		54	1234	(1)	
M24.07 <252>	bit status 1		54	1234	(2)	
M24.08 <253>	bit status 1		55	1234	(1)	
M24.09 <278>	bit status 1		62	1234	(1)	
M24.10 <254>	bit status 1		63	1234	(1)	
M24.11 <255>	bit status 1		63	1234	(2)	
M24.12 <299>	bit status 1		62	1234	(2)	
M24.13 <168>	bit status 1		7	1234	(1)	
M24.14 <300>	bit status 1		7	1234	(2)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE / LABEL / <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
32	M27.01 <149>	LDG SQUAT SWITCH NOSE	OPEN/0V-Sh			
32	M27.02 <147>	LDG SQUAT SWITCH LH	OPEN/0V-Sh			
32	M27.03 <148>	LDG SQUAT SWITCH RH	OPEN/0V-Sh			
34	M28.01 <288>	GPWS MODES	270 00 23		10	10
34	M29.01 <3>	ANGLE OF ATTACK (ADC 1)	221 XX 25	29	12	5
34	M29.02 <558>	ANGLE OF ATTACK (ADC 2)	221 XX 25	29	12	5
29	M30.01 <232>	HYD BLUE SYS NO LOW PR	28V/0V			
29	M30.02 <230>	HYD GRN SYS NO LOW PR	28V/0V			
29	M30.03 <231>	HYD YEL SYS NO LOW PR	28V/0V			
34	M31.01 <250>	GROUND SPEED	312 XX 04		15	32
32	M32.01 <267>	GEAR SELECTOR NOT UP	28V/0V			
32	M32.02 <270>	GEAR SELECTOR NOT DOWN	28V/0V			

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DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M27.01 <149>	bit status 1 on ground		61	1234	(2)	
M27.02 <147>	bit status 1 on ground		61	1234	(3)	
M27.03 <148>	bit status 1 on ground		61	1234	(1)	
M28.01 <288>	bit pos 11 - 18,21,22		42	1234	(1)	
M29.01 <3>	(10) W +/- 180 Deg - 35 to + 85 Deg	R 0.0439 Deg +/- 0.25 Deg	3	1234	9	
M29.02 <558>	W +/- 180 Deg - 35 to + 85 Deg	R 0.0439 Deg +/- 0.25 Deg	35	1234	9	
M30.01 <232>			24	1030	(3)	
M30.02 <230>	bit status 1		24	1030	(4)	
M30.03 <231>	bit status 1		24	1030	(5)	
M31.01 <250>	bit status 1		42	1234	10	
M32.01 <267>	W 4096 Kts	R 0.125 Kts 1 Kts	41	0030	(4)	
M32.02 <270>	bit status 1 (28V)		41	0030	(3)	
	bit status 1 (28V)					

ATA	NO	PARAMETER	INPUT CHARACTERISTICS SIGNAL TYPE < LABEL NO. SDI EQ >	SIGN BIT	DATA BITS	UPD/ SEC
34	RO1A01 <251>	DRIFT ANGLE	321 XX 04	29	15	32
34	RO1B01 <590>	WIND SPEED	315 XX 04		15	16
34	RO1C01 <592>	WIND DIRECTION	316 XX 04	29	15	16
34	RO1D01 <274>	ô > PRES POS LAT FINE	310 XX 02			
34	RO1D02 <344>	/ (1) (2)	310 XX 02	29	20	2(6)
34	RO1D03 <275>	ô > PRES POS LAT COARSE	310 XX 02			10 (7)
34	RO1D04 <345>	/ (1) (3)	310 XX 02			
34	RO1D05 <276>	ô > PRES POS LONG FINE	311 XX 02			
34	RO1D06 <346>	/ (1) (4)	311 XX 02	29	20	2(6)
34	RO1D07 <277>	ô > PRES POS LONG COARSE	311 XX 02			10 (7)
34	RO1D08 <347>	/ (1) (5)	311 XX 02			
32	RO2.01 <284>	BREAKE PEDAL DEFLECTION LH	LLDC 0-5V			
32	RO2.02 <285>	BREAKE PEDAL DEFLECTION RH	LLDC 0-5V			

DFDAU PARAMETER LIST (PART 1)

NO	INPUT CHARACTERISTICS RANGE	INPUT CHARACTERISTICS Accuracy	OUTPUT CHARACTERISTICS WORD	OUTPUT CHARACTERISTICS SUB FRAME	OUTPUT CHARACTERISTICS BITS	PARAMETER CODING
R01A01			41	1000	10	
<251>						
R01B01			41	0030	8	
<590>						
R01C01			41	0200	9	
<592>	W +/- 180 Deg	R 0.0055 Deg				
R01D01	+/- 90 Deg	2.4 Deg				
<274>	W 256 kts	R 0.0078 kts	56	0030	11	
R01D02	0 to 256 kts	9 kts				
<344>	W +/- 180 Deg	R 0.0055 Deg				
R01D03		10 Deg				
<275>	ô		56	1000	8	
R01D04	ô					
<345>	ô					
R01D05	>W N/S 180 Deg	R 0.00017 Deg				
<276>	/ N/S 90 Deg		57	0030	11	
R01D06	/					
<346>	/					
R01D07						
<277>	ô		57	1000	8	
R01D08	ô					
<347>	ô					
R02.01	>W E/W 180 Deg	R 0.00017 Deg	2	1234	6	
<284>	/ E/W 180 Deg					
R02.02	/		2	1234	6	
<285>	/					
	14 to 0 Deg	+/- 1 %				
	14 to 0 Deg	+/- 1 %				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	R03A01 <152>	N2 ENG 1 (8)	LLDC 0-5V			
77	R03A02 <153>	N2 ENG 2 (8)	LLDC 0-5V			
77	R03B01 <154>	EGT ENG 1 (8)	LLDC 0-5V			
77	R03B02 <155>	EGT ENG 2 (8)	LLDC 0-5V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03A01 <152>			56	1000	8	
R03A02 <153>			57	1000	8	
	0 to 120 % rpm (8)	+/- 0.5 % rpm				
R03B01 <154>			51	1000	10	
	0 to 120 % rpm (8)	+/- 0.5 % rpm				
R03B02 <155>			59	1000	10	
	0 to 1000 Deg C (8)	+/- 10 Deg C				
	0 to 1000 Deg C (8)	+/- 10 Deg C				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	R03A01 <152>	N2 ENG 1 (9)	344 10 1A		14	10
77	R03A02 <153>	N2 ENG 2 (9)	344 01 1A		14	10
78	R03B01 <154>	EGT ENG 1 (9)	345 10 1A		11	10
78	R03B02 <155>	EGT ENG 2 (9)	345 01 1A		11	10

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03A01 <152>			56	1000	8	
R03A02 <153>			57	1000	8	
	W 256 % rpm (9)	R 0.016 % rpm				
R03B01 <154>	30.8 to 115.3 % rpm	8 rpm	51	1000	10	
	W 256 % rpm (9)	R 0.016 % rpm				
	30.8 to 115.3 % rpm	8 rpm				
R03B02 <155>			59	1000	10	
	W 2048 Deg C (9)	R 1.0 Deg C				
	90.0 to 818.8 Deg C	+/- 3.9 Deg C				
	W 2048 Deg C (9)	R 1.0 Deg C				
	90.0 to 818.8 Deg C	+/- 3.9 Deg C				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
77	R03A01 <152>	N2 ENG 1 (10)	344 00 1A		14	20
77	R03A02 <153>	N2 ENG 2 (10)	344 00 1A		14	20
78	R03B01 <154>	EGT (T 5) ENG 1 (10)	345 00 1A	29	12	5
78	R03B02 <155>	EGT (T 5) ENG 2 (10)	345 00 1A	29	12	5

DFDAU PARAMETER LIST (PART 1)

NO	INPUT CHARACTERISTICS RANGE	INPUT CHARACTERISTICS Accuracy	OUTPUT CHARACTERISTICS WORD	OUTPUT CHARACTERISTICS SUB FRAME	OUTPUT CHARACTERISTICS BITS	OUTPUT CHARACTERISTICS PARAMETER CODING
R03A01 <152>			56	1000	8	
R03A02 <153>	W 256 % rpm (10) 0 to 120 % rpm	R 0.0156 % rpm 8 rpm	57	1000	8	
R03B01 <154>	W 256 % rpm (10) 0 to 120 % rpm	R 0.0156 % rpm 8 rpm	51	1000	10	
R03B02 <155>	W +/- 2048 Deg C (10) -80.0 to 1000 Deg C	R 0.5 Deg C +/- 4 Deg C	59	1000	10	
	W +/- 2048 Deg C (10) -80.0 to 1000 Deg C	R 0.5 Deg C +/- 4 Deg C				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE / LABEL <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
73	RO3C01 <156>	FUEL FLOW ENG 1	LLDC 0-5V			
73	RO3C02 <157>	FUEL FLOW ENG 2	LLDC 0-5V			
77	RO3D01 <112>	EVM FAN ENG 1 <N1>	135 01 29		8	4
77	RO3D02 <113>	EVM FAN ENG 2 <N1>	135 10 29		8	4
77	RO3D03 <114>	EVM TURBINE ENG 1 <N2>	136 01 29		8	4
77	RO3D04 <115>	EVM TURBINE ENG 2 <N2>	136 10 29		8	4
73	RO3E01 <301>	ENG 1 FUEL LEVER CLOSED	272 01 26		#13	7-25
73	RO3E02 <302>	ENG 2 FUEL LEVER CLOSED	272 01 26		#14	7-25
28	RO3F01 <303>	FIRE VALVE ENG 1 NFC	273 00 29		#12	4
28	RO3F02 <304>	FIRE VALVE ENG 2 NFC	273 00 29		#11	4
79	RO3G01 <134>	OIL QUANTITY ENG 1	073 01 29		11	8
79	RO3G02 <135>	OIL QUANTITY ENG 2	073 10 29		11	8
79	RO3H01 <1004>	OIL TEMP ENG 1	316 01 29		10	4
79	RO3H02 <1005>	OIL TEMP ENG 2	316 10 29		10	4

DFDAU PARAMETER LIST (PART 1)

NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03C01 <156>			48	1234	12	
R03C02 <157>			32	1234	12	
R03D01 <112>	0 to 12 500 Kg/h	+/- 62.5 Kg/h	59	0200	6	
R03D02 <113>	0 to 12 500 Kg/h	+/- 62.5 Kg/h	59	0030	6	
R03D03 <114>	W 12.8 units 0 to 10 units	R 0.05 units	59	0200	6	
R03D04 <115>	W 12.8 units 0 to 10 units	R 0.05 units	59	0030	6	
R03E01 <301>	W 12.8 units 0 to 10 units	R 0.05 units	24	1234	(1)	
R03E02 <302>	W 12.8 units 0 to 10 units	R 0.05 units	24	1234	(2)	
R03F01 <303>	bit status 1		15	1234	(1)	
R03F02 <304>	bit status 1		15	1234	(2)	
R03G01 <134>	bit status 1		56	1000	8	
R03G02 <135>	bit status 1		57	1000	8	
R03H01 <1004>	W 102.4 Quart US 0 to 26 Quart US	R 0.05 Qt US	56	1000	8	
R03H02 <1005>	W 102.4 Quart US 0 to 26 Quart US	R 0.05 Qt US	57	1000	8	
	W 512 Deg C -7 to 300 Deg C	R 0.5 Deg C				
	W 512 Deg C -7 to 300 Deg C	R 0.5 Deg C				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE <LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
79	R03J01 <1002>	OIL PRESSURE ENG 1	317 01 29		9	16
79	R03J02 <1003>	OIL PRESSURE ENG 2	317 10 29		9	16
34	R04A01 <254>	TRAFFIC ALERT VIS ANN	OPEN/OV-SH			
34	R04B01 <255>	RESOLUTION ADVISORY	270 10 35		12	2-3
34	R04C01 <256>	SENSITIVITY LEVEL	016 XX 35		3	5-10
34	R05.01 <365>	WINDSHEAR WARNING	270 XX 25		#25	5
34	R06A01 <366>	PILOT BARO SET FINE (12)ô >	234 01 06		5 (11)	8
34	R06A02 <367>	PILOT BARO SET COARSE(5)/				
34	R06B01 <368>	F/O BARO SET FINE (12)ô >	236 01 06		5 (11)	8
34	R06B02 <369>	F/O BARO SET COARSE(13)/				(
22	R07A01 <1604>	SELECTED ALTITUDE MANUAL	102 XX A1		16	16
22	R08A01 <1602>	SELECTED AIRSPEED	103 XX A1		11	16
34	R08B01 <1242>	ô > AIRSPEED TARGET (1)	103 XX 02		11	5
34	R08B02 <1282>	/	103 XX 02			
22	R09A01 <1608>	SELECTED MACH	106 XX A1		12	16

DFDAU PARAMETER LIST (PART 1)

	INPUT CHARACTERISTICS		OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03J01			56	1000	8	
<1002>						
R03J02			57	1000	8	
<1003>						
R04A01	W 512 psi	R 1.00 psi	27	1234	(1)	
<254>	0 to 400 psi					
R04B01	W 512 psi	R 1.00 psi	43	1234	12	
<255>	0 to 400 psi					
R04C01	bit status 1		27	0004	3	
<256>						
R05.01	bit 29 to 18 (3)		42	1234	(11)	
<365>						
R06A01	bit 17 to 15 (3)		56	1000	8	
<366>						
R06A02	bit status 1		57	1000	7	
<367>						
R06B01			56	1000	8	
<368>	W 7999.9 mb	R 0.1 mb				
R06B02	745 to 1050 mb	+/- 0.25 mb	57	1000	7	
<369>						
R07A01			27	1000	10	
<1604>	W 7999.9 mb	R 0.1 mb				
R08A01	745 to 1050 mb	+/- 0.25 mb	27	0200	9	
<1602>						
R08B01	W 65.536 ft	R 1 ft				
<1242>			27	0030	9	
R08B02	W 512 Kts	R 0.25 Kts				
<1282>						
R09A01	ô		59	0004	6	
<370>	> W 512 Kts	R 0.25 Kts				
	/					
	W 4.096 MACH	0.001 MACH				

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL NO. SDI EQ >	SIGN BIT	DATA BITS	UPD/ SEC
34	R09B01 <1244>	ô > MACH TARGET (1)	106 XX 02		12	5
34	R09B02 <1284>	/	106 XX 02			
22	R10A01 <1600>	SELECTED VERTICAL SPEED	104 XX A1	29	10	16
22	R11.01 <1606>	SELECTED HEADING	101 XX A1	29	12	16
34	R12A01 <1246>	ô > BEARING TO WAYPOINT (1)	115 XX 01	29	12	20
34	R12A02 <1286>	/	115 XX 01			
34	R12A03 <263>	SELECTED COURSE #1	100 XX 11	29	9	20
34	R12A04 <1411>	SELECTED COURSE #2	100 XX 11	29	9	20
34	R12B01 <238>	CAPT SEL FLIGHT PATH ANGLE	273 XX C5	19	7 (14)	10
34	R12B02 <239>	F/O SEL FLIGHT PATH ANGLE	273 XX C5	19	7 (14)	10
34	R13.01 <341>	PILOT SELECTED DH FINE ô (15) >	370 XX 25		16	5
34	R13.02 <342>	PILOT SELECTED DH COARSE/ (16)				
34	R13.03 <348>	F/O SELECTED DH FINE ô (15) >	370 XX 25		16	5
34	R13.04 <349>	F/O SELECTED DH COARSE / (16)				

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R09B01 <372>	ô		59	0004	6	
R09B02 <373>	> W /	4.096 MACH	R 0.001 MACH			
R10A01 <374>	W	+/-16.384 ft/min	R 16 ft/min	27	0004	8
R11.01 <387>	W	+/- 180 Deg	R 0.044 Deg	56	1000	8
R12A01 <1246>	ô			56	0200	9
R12A02 <1286>	> W /	+/- 180 Deg	R 0.044 Deg			
R12A03 <263>	M	+/- 180 Deg	R 0.35 Deg	56	1000	8
R12A04 <1411>	W	0 to 360 Deg +/- 180 Deg	R 0.35 Deg	57	1000	8
R12B01 <238>	W	0 to 360 Deg +/- 12.8 DEG	R 0.1 DEG	56	1000	8
R12B02 <239>	W	+/- 12.8 DEG	R 0.1 DEG	57	1000	8
R13.01 <341>				57	1000	8
R13.02 <342>	W	8192 ft	R 0.125 Deg	56	1000	8
R13.03 <348>				57	1000	8
R13.04 <349>	W	8192 ft	R 0.125 Deg	56	1000	8

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
34	R14A01 <416>	NAV or VOR	272 XX C5		#25	10
34	R14A02 <417>	ILS	272 XX C5 273 XX C5		2	10
34	R14A03 <418>	SPARE	272 XX C5 273 XX C5		2	10
34	R14A04 <419>	PLAN	272 XX C5		#14	10
34	R14A05 <420>	ROSE	272 XX C5		#28	10
34	R14A06 <421>	ARC	273 XX C5		#23	10
34	R14A07 <422>	MAP	272 XX C5		#11	10
34	R14A08 <423>	DISTANCE 15 NM	273 XX C5		2	10
34	R14A09 <424>	DISTANCE 30 NM	273 XX C5		2	10
34	R14A10 <425>	DISTANCE 60 NM	273 XX C5		2	10
34	R14A11 <426>	DISTANCE 120 NM	273 XX C5		2	10
34	R14A12 <427>	DISTANCE 240 NM	273 XX C5		2	10
34	R14A13 <428>	PILOT PFD FAULT	350 XX 25		#11	10
34	R14A14 <429>	PILOT ND FAULT	350 XX 25		#16	10
34	R14A15 <430>	PILOT CP FAULT	350 XX 25		#14	10
34	R14A16 <431>	FNSG 1 or 3 FAULT	350 XX 25		#18	10

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R14A01 <416>			5	0200	2	
R14A02 <417>	bit status 0		5	0200	2	
R14A03 <418>	bit 25 = 1 and bit 21 = 0		5	0200	2	
R14A04 <419>	bit 25 = 1 and bit 21 = 1		19	1000	3	
R14A05 <420>	bit status 1		19	1000	3	
R14A06 <421>	bit status 1		19	1000	3	
R14A07 <422>	bit status 1		19	1000	3	
R14A08 <423>	bit status 1		19	1000	3	
R14A09 <424>	bit 24 and 25		19	1000	3	
R14A10 <425>	bit 25 and 26		19	1000	3	
R14A11 <426>	bit 26 and 27		19	1000	3	
R14A12 <427>	bit 27 and 28		19	1000	3	
R14A13 <428>	bit 28 and 29		5	1000	(2)	
R14A14 <429>	bit status 1		5	1000	(1)	
R14A15 <430>	bit status 1		6	1000	(2)	
R14A16 <431>	bit status 1		6	1000	(1)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
34	R14B01 <432>	NAV or VOR	272 XX C5		#25	10
34	R14B02 <433>	ILS	272 XX C5 273 XX C5		2	10
34	R14B03 <434>	SPARE	272 XX C5 273 XX C5		2	10
34	R14B04 <435>	PLAN	272 XX C5		#14	10
34	R14B05 <436>	ROSE	272 XX C5		#28	10
34	R14B06 <437>	ARC	273 XX C5		#23	10
34	R14B07 <438>	MAP	272 XX C5		#11	10
34	R14B08 <439>	DISTANCE 15 NM	273 XX C5		2	10
34	R14B09 <446>	DISTANCE 30 NM	273 XX C5		2	10
34	R14B10 <447>	DISTANCE 60 NM	273 XX C5		2	10
34	R14B11 <472>	DISTANCE 120 NM	273 XX C5		2	10
34	R14B12 <473>	DISTANCE 240 NM	273 XX C5		2	10
34	R14B13 <474>	FIRST OFFICER PFD FAULT	350 XX 25		#12	10
34	R14B14 <475>	FIRST OFFICER ND FAULT	350 XX 25		#17	10
34	R14B15 <476>	FIRST OFFICER CP FAULT	350 XX 25		#15	10
34	R14B16 <477>	FNSG 2 or 3 FAULT	350 XX 25		#18	10

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R14B01 <432>			5	0004	2	
R14B02 <433>	bit status 0		5	0004	2	
R14B03 <434>	bit 25 = 1 and bit 21 = 0		5	0004	2	
R14B04 <435>	bit 25 = 1 and bit 21 = 1		19	0030	3	
R14B05 <436>	bit status 1		19	0030	3	
R14B06 <437>	bit status 1		19	0030	3	
R14B07 <438>	bit status 1		19	0030	3	
R14B08 <439>	bit status 1		19	0030	3	
R14B09 <446>	bit 24 and 25		19	0030	3	
R14B10 <447>	bit 25 and 26		19	0030	3	
R14B11 <472>	bit 26 and 27		19	0030	3	
R14B12 <473>	bit 27 and 28		19	0030	3	
R14B13 <474>	bit 28 and 29		5	0030	(2)	
R14B14 <475>	bit status 1		5	0030	(1)	
R14B15 <476>	bit status 1		6	0030	(2)	
R14B16 <477>	bit status 1		6	0030	(1)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE / LABEL <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
31	R15.01 <391>	ECAM CP.CODE 0	OPEN/OV-Sh			
31	R15.02 <392>	ECAM CP.CODE 1	OPEN/OV-Sh			
31	R15.03 <393>	ECAM CP.CODE 2	OPEN/OV-Sh			
31	R15.04 <394>	ECAM CP.CODE 3	OPEN/OV-Sh			
31	R15.05 <383>	ECAM DU WARN FAULT	OPEN/OV-Sh			
31	R15.06 <384>	ECAM DU WARN OFF	28V/OPEN			
31	R15.07 <385>	ECAM DU SYS FAULT	OPEN/OV-Sh			
31	R15.08 <386>	ECAM DU SYS OFF	28V/OPEN			
34	R16.01 <236>	DME 1 DISTANCE	201 xx 09		19	6
34	R16.02 <237>	DME 2 DISTANCE	201 xx 09		19	6
24	R17.01 <377>	AC BUS 1 OFF	28/OVOPEN			
24	R17.02 <297>	AC BUS 2 OFF	270 00 29		2	4
24	R18.01 <298>	DC NORMAL BUS OFF	276 01 26		#17	7-25

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R15.01 <391>			24	0200	(3)	
R15.02 <392>	(2)		24	0200	(4)	
R15.03 <393>	(2)		24	0200	(5)	
R15.04 <394>	(2)		24	0200	(6)	
R15.05 <383>	(2)		50	0200	(1)	
R15.06 <384>	bit status 0 (GND)		50	0200	(2)	
R15.07 <385>	bit status 1 (28V)		50	0200	(3)	
R15.08 <386>	bit status 0 (GND)		50	0200	(4)	
R16.01 <236>	bit status 1 (28V)		18	0200	11	
R16.02 <237>	W 799.99 NM 0 to 300 NM	R 0.01 NM 1 NM	18	0004	11	
	W 799.99 NM 0 to 300 NM	R 0.01 NM 1 NM	41	0200	(1)	
R17.01 <377>	bit status 1 (28V)		41	0200	(2)	
R17.02 <297>	not bit 24 and not bit 25		41	0200	(3)	
R18.01 <298>	bit status 1					

	DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER		SIGNAL TYPE < LABEL <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
21	R19.01 <132>	BLEED VALVE ENG 1 OPEN		145 00 29		#12	4
21	R19.02 <133>	BLEED VALVE ENG 2 OPEN		145 00 29		#11	4
21	R19.03 <130>	X FEED VALVE CLOSED		145 00 29		#24	4
21	R19.04 <136>	PACK MAN MODE SEL 1		145 00 29		#26	4
21	R19.05 <137>	PACK MAN MODE SEL 2		145 00 29		#25	4
30	R19.06 <138>	INLET AI VALVE ENG 1 OPEN		OPEN/OV-Sh			
30	R19.07 <139>	INLET AI VALVE ENG 2 OPEN		OPEN/OV-Sh			
30	R19.08 <140>	WING AI VALVE LH NORM UNCL		OPEN/OV-Sh			
30	R19.09 <141>	WING AI VALVE RH NORM UNCL		OPEN/OV-Sh			
30	R19.10 <158>	WING AI VALVE LH ALT UNCL		OPEN/OV-Sh			
30	R19.11 <159>	WING AI VALVE RH ALT UNCL		OPEN/OV-Sh			
80	R19.12 <142>	START V POS ENG 1		28V/0V			
80	R19.13 <143>	START V POS ENG 2		28V/0V			
21	R20.01 <131>	APU BLEED VALVE NOT OPEN		145 00 29		#15	4

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R19.01			19	1030	(5)	
<132>						
R19.02			19	1030	(6)	
<133>	bit status 1					
R19.03			41	1030	(2)	
<130>	bit status 1					
R19.04			51	0204	(1)	
<136>	bit status 1					
R19.05			51	0204	(2)	
<137>	bit status 1					
R19.06			56	0200	(2)	
<138>	bit status 1					
R19.07			56	0200	(3)	
<139>	bit status 1					
R19.08			50	0004	(3)	
<140>	bit status 1					
R19.09			50	0004	(2)	
<141>	bit status 1					
R19.10			50	0004	(4)	
<158>	bit status 1					
R19.11			50	0004	(1)	
<159>	bit status 1					
R19.12			57	0030	(1)	
<142>	bit status 1					
R19.13			56	0030	(1)	
<143>	bit status 1					
R20.01			24	1030	(6)	
<131>	bit status 1					

ATA	NO	PARAMETER	INPUT CHARACTERISTICS SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
27	R21.01 <279>	PITCH TRIM 1 FAULT	126 01 26		#27	7-25
27	R21.02 <280>	PITCH TRIM 2 FAULT	126 01 26		#28	7-25
27	R21.03 <22>	SLATS 1 + 2 FAULT	126 01 26		#11	7-25
27	R21.04 <23>	FLAPS 1 + 2 FAULT	126 01 26		#12	7-25
27	R21.05 <769>	YAW DAMPER 1 FAULT	126 01 26		#25	7-25
27	R21.06 <770>	YAW DAMPER 2 FAULT	126 01 26		#26	7-25
77	R21.07 <362>	EEC 1 FAULT (9)	350 00 1A		#15	5
77	R21.08 <363>	EEC 2 FAULT (9)	350 00 1A		#15	5
77	R22.01 <5107>	N1 CMD ENG 1 (8)	341 XX 1A		12	16
77	R22.02 <5157>	N1 CMD ENG 2 (8)	341 XX 1A		12	16
77	R22.03 <5215>	EPR CMD ENG 1 (9)	341 00 1A		13	20
77	R22.04 <5315>	EPR CMD ENG 1 (9)	341 00 1A		13	20
34	R23.01 <1259>	ô > N1 TARGET (1) (8)	343 XX 02		14	5
34	R23.02 <1299>	/	343 XX 02			
34	R23.03 <1260>	ô > EPR TARGET (1) (8)	343 XX 02		12	5
34	R23.04 <1300>	/	343 XX 02			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R21.01			57	0004	(8)	
<279>						
R21.02			57	0004	(9)	
<280>	bit status 1					
R21.03			57	0004	(12)	
<22>	bit status 1					
R21.04			56	0200	(1)	
<23>	bit status 1					
R21.05			57	0004	(10)	
<769>	bit status 1					
R21.06			57	0004	(11)	
<770>	bit status 1					
R21.07			57	0004	(6)	
<362>	bit status 1					
R21.08			57	0004	(7)	
<363>	bit status 1					
R22.01			26	1030	6	
<5107>	bit status 1					
R22.02			26	1030	6	
<5157>	W 256 %rpm	R 0.0625 %rpm				
R22.03	20 to 120 %rpm		26	1030	6	
<5215>	W 256 %rpm	R 0.0625 %rpm				
R22.04	20 to 120 %rpm		26	1030	6	
<5315>	W 4	R 0.005				
R23.01						
<1259>	W 4	R 0.005	50	1000	6	
R23.02						
<1299>	ô					
R23.03	> W 256 %rpm	R 0.015 %rpm				
<1260>	/		50	1000	6	
R23.04						
<1300>	ô					
	> W 4	R 0.001				
	/					

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
31	R24.01 <167>	CENTER OF GRAVITY	076 00 3E		14	5
28	R25.01 <170>	TRIM TANK QUANTITY	263 00 2C		15	1
34	R28.01 <260>	ILS 1 FREQUENCY	033 XX 10		4 (11)	5
34	R28.02 <864>	ILS 2 FREQUENCY	033 XX 10		4 (11)	5
34	R28.03 <266>	VOR 1 FREQUENCY	034 XX 11		4 (11)	5
34	R28.04 <259>	VOR 2 FREQUENCY	034 XX 11		4 (11)	5
34	R30.01 <104>	EVENT (depressed)	OPEN/OV-Sh			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R24.01			57	1000	8	
<167>						
R25.01			56	1000	8	
<170>	W 163.84 % MAC	R 0.01 % MAC				
R28.01			49	1000	12	
<260>	W 131 072 lbs	R 4.0 lbs				
R28.02	11 700 lbs	+/- 585 lbs	49	0030	12	
<864>	W 8.00 to 11.95 MHz (17)	R 0.01 MHz				
R28.03	108.00 to 111.95 MHz		49	0200	12	
<266>	W 8.00 to 11.95 MHz(17)	R 0.01 MHz				
R28.04	108.00 to 111.95 MHz		49	0004	12	
<259>	W 8.00 to 17.95 MHz (17)	R 0.01 MHz				
R30.01	108.00 to 117.95 MHz		55	1234	(2)	
<104>	W 8.00 to 17.95 MHz (17)	R 0.01 MHz				
	108.00 to 117.95 MHz					
	bit status 0					
	button depressed					

	DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER		SIGNAL TYPE < LABEL <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
31	105	DOC DATA - DATE		260 00 31		11	7.5
34	106	ô		261 XX 02			
		> DOC DATA - FLIGHT NO				16	1
34	1292	/		261 XX 02			
34	107	ô					
		> DOC DATA - SPARE FOR					
34	1291	/ FLIGHT LEG					
31	108	A/C TYPE		OPEN/0V			
31	109	A/C TAIL NUMBER		OPEN/0V			
31	110	FLEET IDENTIFICATION		OPEN/0V			
31	111	BITE					
31	165	DFDAU PROGRAM IDENT					
34	166	ô		263 XX 02			
		> DATA BASE UPDATE				12	1
34	1309	/		263 XX 02			
34	271	ô		075 XX 02			
		> GROSS WEIGHT				15	5
34	1281	/		075 XX 02			
32	144	LDG DOWN AND LOCK LH		28V/0V-sh			
32	145	LDG DOWN AND LOCK RH		28V/0V-sh			
32	146	LDG DOWN AND LOCK NOSE		28V/0V-sh			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
105			41	0004	6	
					+5	
106	0 to 31 Days	1 Day				
	0 to 12 Months	1 Mounth	41	0004	8	
1292					+8	
	ô					
107	> 0 to 9999	1				
	/		41	0004	12	
1291						
108			41	0004	6	
109			41	0004	8	
	:					
110	: For bit		41	0004	4	
	> status					
111	: see Table 3		57	0200	12	
	:					
165			41	0004	8	
	12 BIT					
166						
	8 BIT		41	0004	6	
1309					+6	
	ô					
271	> DAY, MOUNTH, CYCLE					
	/		41	0004	8	
1281					+7	
	ô					
144	> W 1 310 720 lbs	R 40 lbs				
	/ 154300 to 305560 lbs					
145						
	bit status 0					
146						
	bit status 0					
	bit status 0					

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
27	169	PITCH TRIM WHEEL SYNC (1)	SYNCHRO			
31	272	PRINT (depressed)	28V/0V			
76	289	FUEL SHUT OFF VALVE ENG 1	28V/0V			
76	290	FUEL SHUT OFF VALVE ENG 2	28V/0V			
	350	SPARE 1	SYNCHRO			
	351	SPARE 2	SYNCHRO			
	352	SPARE 3	DCR 0-5V			
	353	SPARE 4	DCR 0-5V			
	354	SPARE 5	POT			
	355	SPARE 6	LLDC 0-5V			
77	356	FAN DISPLACEMENT ENG 1(4)	LLDC 0-5V			
77	357	FAN DISPLACEMENT ENG 2(4)	LLDC 0-5V			
79	358	OIL FLTR DIFF PR ENG 1	LLDC 0-5V			
79	359	OIL FLTR DIFF PR ENG 2	LLDC 0-5V			
	360	SPARE 11	LLDC 0-5V			
	361	SPARE 12	LLDC 0-5V			
	376	GPWS TEST	28V/0V			
	381	SPARE 18	28V/0V			
	382	SPARE 19	28V/0V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
169						
272	+ 61.9 to - 289 Deg	0.167 Deg				
289	bit status 1 (28V)					
290	bit status 1 (28V) valve open					
350	bit status 1 (28V) valve open					
351						
352						
353						
354						
355						
356						
357	0 to 15 mils (9)					
358	0 to 15 mils (9)					
359	0 to 80 psis	+/- 1 %				
360	0 to 80 psis	+/- 1 %				
361						
376						
381	bit status 0 (OV)					
382						

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
	383	SPARE 20	28V/0V			
	385	SPARE 22	28V/0V			
	387	SPARE 24	28V/0V			
	388	SPARE 25	28V/0V			
	389	DFDR PLAYBACK DEFINITION	28V/0V			
	397	SPARE 34	OPEN/0V-sh			
	398	SPARE 35	OPEN/0V-sh			
	399	SPARE 36	OPEN/0V-sh			
77	400	N1 ENG 1	LLDC 0-5V			
77	401	N1 ENG 2	LLDC 0-5V			
27	402	AILERON TRIM	SYNCHRO			
27	403	RUDDER TRIM	LLDC 0-5V			
77	404	N1 VIBR ANGLE ENG 1 (4)	LLDC 0-5V			
77	405	N1 VIBR ANGLE ENG 2 (4)	LLDC 0-5V			
34	406	SIDE SLIP ANGLE	POT			
27	440	RUDDER PEDAL POSITION	SYNCHRO			
27	441	ELEVATOR SPLIT UNC PITCH	28V/0V			
	442	SPARE 40	POT			
	443	SPARE 41	ACR 0-26V			
	444	SPARE 42	ACR 0-26V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
383						
385						
387						
388						
389						
397						
	bit status 1 (28V)					
398						
399						
400						
401						
	0 to 120 % rpm	+/- 0.5 % rpm				
402						
	0 to 120 % rpm	+/- 0.5 % rpm				
403						
	+/- 7 Deg	+/- 3 %				
404						
	+/- 21 Deg	+/- 1 %				
405						
	0 to 360 Deg	TBD				
406						
	0 to 360 Deg	TBD				
440						
	TBD	TBD				
441						
	+/- 99 mm	+/- 1,75 mm				
442						
	bit status 0 (0V)					
443						
444						

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
	445	SPARE 43	SYNCHRO			
32	448	BRAKE/A-SKID SEL ALT/ON	28V/OPEN			
74	449	IGNITION A SELECTED	28V/OPEN			
74	450	IGNITION B SELECTED	28V/OPEN			
32	451	AUTO BRAKE MODE MAX	28V/OPEN			
32	452	AUTO BRAKE MODE MED	28V/OPEN			
32	453	AUTO BRAKE MODE LOW	28V/OPEN			
34	454	GPWS WARN MODE 1-4	28V/0V			
34	455	GPWS WARN G/S	28V/0V			
32	456	BRAKE/A-SKID SEL ALT/OFF	28V/OPEN			
32	457	BRAKE/A-SKID SEL NORMAL/ON	28V/OPEN			
32	458	WHEEL SPEED LH 1	LLDC 0-5V			
32	459	WHEEL SPEED LH 2	LLDC 0-5V			
32	460	WHEEL SPEED RH 3	LLDC 0-5V			
32	461	WHEEL SPEED RH 4	LLDC 0-5V			
32	462	WHEEL SPEED LH 5	LLDC 0-5V			
32	463	WHEEL SPEED LH 6	LLDC 0-5V			
32	464	WHEEL SPEED RH 7	LLDC 0-5V			
32	465	WHEEL SPEED RH 8	LLDC 0-5V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
445						
448						
449						
	bit status 1 (28 V)					
450						
	bit status 1 (28 V)					
451						
	bit status 1 (28 V)					
452						
	bit status 1 (28 V)					
453						
	bit status 1 (28 V)					
454						
	bit status 1 (28 V)					
455						
	bit status 0 (0V)					
456						
	bit status 0 (0V)					
457						
	bit status 1 (28 V)					
458						
	bit status 1 (28 V)					
459						
	0 to 100 m/s	+/- 3 %				
460						
	0 to 100 m/s	+/- 3 %				
461						
	0 to 100 m/s	+/- 3 %				
462						
	0 to 100 m/s	+/- 3 %				
463						
	0 to 100 m/s	+/- 3 %				
464						
	0 to 100 m/s	+/- 3 %				
465						
	0 to 100 m/s	+/- 3 %				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
32	466	WHEEL SPEED LH NOSE	LLDC 0-5V			
32	467	WHEEL SPEED RH NOSE	LLDC 0-5V			
32	468	BRAKE PR TRANS LH GREEN SY	LLDC 0-5V			
32	469	BRAKE PR TRANS RH GREEN SY	LLDC 0-5V			
32	470	BRAKE V PRES LH YELLOW SYS	LLDC 0-5V			
32	471	BRAKE V PRES RH YELLOW SYS	LLDC 0-5V			
49	480	APU START SWITCH ON	28V/OPEN			
	481	SPARE 37	PROBE			
	482	SPARE 38	PROBE			
27	835	FLAPS POS (FEED BACK SYNC)	137 01 1B	29	12	5
75	1426	VSV POSITION ENG 1 (4)	072 00 1C	29	12	5
75	1427	VBV POSITION ENG 1 (4)	071 00 1C	29	12	5
75	1466	VSV POSITION ENG 2 (4)	072 00 1C	29	12	5
75	1467	VBV POSITION ENG 2 (4)	071 00 1C	29	12	5
75	1625	VSV POSITION ENG 1 (2)	072 10 1C	29	11	5
75	1637	3.0 BLD POS ENG 1 (2)	074 10 1C		10	5
75	1665	VSV POSITION ENG 2 (2)	072 01 1C	29	11	5
75	1677	3.0 BLD POS ENG 2 (2)	074 01 1C		10	5

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
466	0 to 100 m/s	+/- 3 %				
467	0 to 100 m/s	+/- 3 %				
468	0 to 100 m/s	+/- 3 %				
469	0 to 200 bar	+/- 3 %				
470	0 to 200 bar	+/- 3 %				
471	0 to 2500 psi	+/- 5 %				
480	0 to 2500 psi	+/- 5 %				
481	bit status 1 (28V)					
482						
835						
1426	W +/- 180 Deg	R 0.0439 Deg				
	0 to 41 Deg (3)	0.5 %				
1427	0 to 33.5 Deg (1)	0.5 %				
1466	W +/- 64 Deg	R 0.0156 Deg				
	- 6.5 to +44.515 Deg	+/- 0.5 % FS				
1467	W +/- 4 inch	R 0.001 inch				
	-0.03 to +1.823 in (2)	+/- 0.5 % FS				
1625	W +/- 64 Deg	R 0.0156 Deg				
	- 6.5 to +44.515 Deg	+/- 0.5 % FS				
1637	W +/- 4 inch	R 0.001 inch				
	-0.03 to +1.823 in (2)	+/- 0.5 % FS				
1665	W +/- 180 Deg	R 0.088 Deg				
	-40 to +10 Deg	+/- 0.2 Deg				
1677	W 4 inches	R 0.004 inch				
	0 to 1.886 inches	+/- 0.023 in				
	W +/- 180 Deg	R 0.088 Deg				
	-40 to +10 Deg	+/- 0.2 Deg				
	W 4 inches	R 0.004 inch				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE / LABEL (NO.SDI EQ)	SIGN BIT	DATA BITS	UPD/SEC
	4050	V max	207 01 0A		16	8
	4150	V max	207 10 0A		16	8
77	4711	STATOR VANE ACTUATOR FB (SVA) ENG 1 (2)	325 00 1C	29	12	5
	4720	B 2.5 ENG 1 (2)	335 00 1C	29	12	5
77	5011	STATOR VANE ACTUATOR FB (SVA) ENG 2 (2)	325 00 1C	29	12	5
	5020	B 2.5 ENG 2 (2)	335 00 1C	29	12	5

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
4050	0 to 1.886 inches	+/- 0.023 in				
4150	W 1024 kts	R 0.0156 kts				
4711	W 1024 kts	R 0.0156 kts				
4720	W +/- 128 % open -5 to 105 % open	R 0.0312% open				
5011	W +/- 128 % open -5 to 102 % open	R 0.0312% open				
5020	W +/- 128 % open -5 to 105 % open	R 0.0312% open				
	W +/- 128 % open -5 to 102 % open	R 0.0312% open				

(2)Summary of Input/Output Data
For the full description of the parameters and simplification, parts of the listed and additional information is summarized in separate tables. The tables show the summary of:
- **DFDAU** input pin assignment
- **DFDR** word and frame assignment
- transferred **DFDAU** output bus labels

(a)**DFDAU** Input Assignment
The connections between the sensors or respective computers and the **DFDAU** are shown in the inputs interconnection diagrams and **AIDS** input diagrams and include analog and discrete parameters and digital **ARINC 429** data buses.

(b)**DFDR** Word and Frame Assignment
The collected parameters are transmitted from the **DFDAU** to the **DFDR** and stored in defined word slots. These word slots are described in the parameter list. The summary of the word location is shown in the word frame tables. The whole frame with 4 subframes and 64 words per subframe will be repeated every 4 seconds (64 words/sec).
For parameters received via an **ARINC 429** bus the relation between the **DFDR** bits and the corresponding **ARINC 429** bit number is mentioned in the word frame table under the parameter name. The first mentioned **ARINC 429** bit number is located at the **DFDR MSB** (bit no. 12) and normally the following **ARINC 429** bits are located corresponding up to the **DFDR LSB** (bit 3 or 1). For exeptions to this rule, that **ARINC** bit number is mentioned, which is located on the next **DFDR** bit. Also the corresponding label, **SDI** and equipment code (**EQ**) of the parameter are listed in brackets.
The word slot for documentary data (word 23, subframe 2) is an exception from this routine. This slot is designed as a superframe. This means, the information in this slot varies during a 16 frame cycle according to the documentary data superframe summary.
After 16 frame cycles (64 sec.) the contents of the doc. data word slot will be repeated with the respective updated information.

R (Ref. Fig. 001)
R (Ref. Fig. 001)
R (Ref. Fig. 001)
R (Ref. Fig. 001)
R (Ref. Fig. 002)
(Ref. Fig. 003, 004, 005)
R (Ref. Fig. 006, 007)

Detailed Description of Pararameters

The parameter list in conjunction with the summary of input/output data describes sufficiently the parameters received by the **DFDAU**.
For parameters which have abnormal or special characteristics the detailed description of parameters is attached. Those characteristics are
- nonlinear function (curves),
- varying accuracy,
- relationship between analog input value and source parameter value,
- special **ARINC 429** word occupation,
- special **DFDR** word slot occupation and

WORD NO	SUBFRAME 1 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 2 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 3 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 4 MSB BIT 12 — INPUT BITS — LSB BIT 1	WORD NO
1	0 0 1 0 0 1 0 0 0 1 1 1	0 1 0 1 1 0 1 1 1 0 0 0	1 0 1 0 0 1 0 0 0 1 1 1	1 1 0 1 1 0 1 1 1 0 0 0	1
2	BRAKE PEDAL DEFLECTION LH; BRAKE PEDAL DEFLECTION RH	BRAKE PEDAL DEFLECTION LH; BRAKE PEDAL DEFLECTION RH	BRAKE PEDAL DEFLECTION LH; BRAKE PEDAL DEFLECTION RH	BRAKE PEDAL DEFLECTION LH; BRAKE PEDAL DEFLECTION RH	2
3	ANGLE OF ATTACK (ADC 1) 29,27 20; FD #1; A/P CWS #1; A/P CMD #1	ANGLE OF ATTACK (ADC 1) 29,27 20; FD #1; A/P CWS #1; A/P CMD #1	ANGLE OF ATTACK (ADC 1) 29,27 20; FD #1; A/P CWS #1; A/P CMD #1	ANGLE OF ATTACK (ADC 1) 29,27 20; FD #1; A/P CWS #1; A/P CMD #1	3
4	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	4
5	BODY LONG ACCEL; PILOT PFD FAULT; PILOT ND FAULT	BODY LONG ACCEL; EFIS PLT PFD	BODY LONG ACCEL; F/O PFD FAULT; F/O ND FAULT	BODY LONG ACCEL; EFIS F/O PFD	5
6	BODY LATERAL ACCEL; PILOT CP FAULT; FSNG 3 OR 1 FAULT	BODY LATERAL ACCEL	BODY LATERAL ACCEL; F/O CP FAULT; FSNG 3 OR 1 FAULT	BODY LATERAL ACCEL	6
7	ELEVATOR POSITION 29,26 18; LAND ASAP; AFT CG	ELEVATOR POSITION 29,26 18; LAND ASAP; AFT CG	ELEVATOR POSITION 29,26 18; LAND ASAP; AFT CG	ELEVATOR POSITION 29,26 18; LAND ASAP; AFT CG	7
8	EPR/N1 ENG 1 28 P&W 20, 27 GE 19; SPOILER 5 RH RET; SPOILER 3 RH RET; SPOILER 5 LH RET	EPR/N1 ENG 1 28 P&W 20, 27 GE 19; SPOILER 5 RH RET; SPOILER 3 RH RET; SPOILER 5 LH RET	EPR/N1 ENG 1 28 P&W 20, 27 GE 19; SPOILER 5 RH RET; SPOILER 3 RH RET; SPOILER 5 LH RET	EPR/N1 ENG 1 28 P&W 20, 27 GE 19; SPOILER 5 RH RET; SPOILER 3 RH RET; SPOILER 5 LH RET	8
9	MAGNETIC HEADING 29,28 20; HF; VHF	MAGNETIC HEADING 29,28 20; HF; VHF	MAGNETIC HEADING 29,28 20; HF; VHF	MAGNETIC HEADING 29,28 20; HF; VHF	9
10	COMPUTED AIRSPEED 27 19; SPOILER 5 LH RET; SPOILER 3 LH RET; SPOILER 4 LH RET	COMPUTED AIRSPEED 27 19; SPOILER 5 LH RET; SPOILER 3 LH RET; SPOILER 4 LH RET	COMPUTED AIRSPEED 27 19; SPOILER 5 LH RET; SPOILER 3 LH RET; SPOILER 4 LH RET	COMPUTED AIRSPEED 27 19; SPOILER 5 LH RET; SPOILER 3 LH RET; SPOILER 4 LH RET	10
11	RADIO HEIGHT RA 1 27 16	RADIO HEIGHT RA 1 27 16	RADIO HEIGHT RA 1 27 16	RADIO HEIGHT RA 1 27 16	11
12	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	12
13	PITCH ANGLE 29,27 20; SPOILER 2 RH RET; SPOILER 4 RH RET; SPOILER 3 RH RET	PITCH ANGLE 29,27 20; SPOILER 2 RH RET; SPOILER 4 RH RET; SPOILER 3 RH RET	PITCH ANGLE 29,27 20; SPOILER 2 RH RET; SPOILER 4 RH RET; SPOILER 3 RH RET	PITCH ANGLE 29,27 20; SPOILER 2 RH RET; SPOILER 4 RH RET; SPOILER 3 RH RET	13
14	ROLL ANGLE 29,28 20; SPOILER 5 RH RET; SPOILER 3 RH RET	ROLL ANGLE 29,28 20; SPOILER 5 RH RET; SPOILER 3 RH RET	ROLL ANGLE 29,28 20; SPOILER 5 RH RET; SPOILER 3 RH RET	ROLL ANGLE 29,28 20; SPOILER 5 RH RET; SPOILER 3 RH RET	14
15	ALL SPEED AILERON LH 29,26 18; FIRE VALVE ENG 2; FIRE VALVE ENG 1	ALL SPEED AILERON LH 29,26 18; FIRE VALVE ENG 2; FIRE VALVE ENG 1	ALL SPEED AILERON LH 29,26 18; FIRE VALVE ENG 2; FIRE VALVE ENG 1	ALL SPEED AILERON LH 29,26 18; FIRE VALVE ENG 2; FIRE VALVE ENG 1	15
16	TRA/TLA ENG 1 27 P&W 21, 26 GE 22; TRA/TLA ENG 2 27 P&W 21, 26 GE 22	TRA/TLA ENG 1 27 P&W 21, 26 GE 22; TRA/TLA ENG 2 27 P&W 21, 26 GE 22	TRA/TLA ENG 1 27 P&W 21, 26 GE 22; TRA/TLA ENG 2 27 P&W 21, 26 GE 22	TRA/TLA ENG 1 27 P&W 21, 26 GE 22; TRA/TLA ENG 2 27 P&W 21, 26 GE 22	16

DFDR Word and Frame Assignment (Sheet 1/4)
Figure 001

WORD NO	SUBFRAME 1 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 2 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 3 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 4 MSB BIT 12 INPUT BITS LSB BIT 1	WORD NO
17	SLATS POSITION; AFCS MODES MATRIX	SLATS POSITION; AFCS MODES MATRIX	SLATS POSITION; AFCS MODES MATRIX	SLATS POSITION; AFCS MODES MATRIX	17
18		DME 1 DISTANCE 29 19		DME 2 DISTANCE 29 19	18
19	EFIS PILOT PFD; BLEED VALVE ENG 2; BLEED VALVE ENG 1; AFCS MODES MATRIX	FLAPS POSITION; AFCS MODES MATRIX	EFIS F/O PFD; BLEED VALVE ENG 2; BLEED VALVE ENG 1; AFCS MODES MATRIX	FLAPS POSITION; AFCS MODES MATRIX	19
20	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	20
21	BODY LONG ACCEL; REVERSER IN POS ENG 1; REVERSER UNLOCK ENG 1	BODY LONG ACCEL; REVERSER IN POS ENG 1; REVERSER UNLOCK ENG 1	BODY LONG ACCEL; REVERSER IN POS ENG 1; REVERSER UNLOCK ENG 1	BODY LONG ACCEL; REVERSER IN POS ENG 1; REVERSER UNLOCK ENG 1	21
22	BODY LATERAL ACCEL; REVERSER IN POS ENG 2; REVERSER UNLOCK ENG 2	BODY LATERAL ACCEL; REVERSER IN POS ENG 2; REVERSER UNLOCK ENG 2	BODY LATERAL ACCEL; REVERSER IN POS ENG 2; REVERSER UNLOCK ENG 2	BODY LATERAL ACCEL; REVERSER IN POS ENG 2; REVERSER UNLOCK ENG 2	22
23	ELEVATOR POSITION 29,26 18; PITCH GA MODE; YAW TAKE OFF MODE	ELEVATOR POSITION 29,26 18; PITCH GA MODE; YAW TAKE OFF MODE	ELEVATOR POSITION 29,26 18; PITCH GA MODE; YAW TAKE OFF MODE	ELEVATOR POSITION 29,26 18; PITCH GA MODE; YAW TAKE OFF MODE	23
24	SPEED BRAKE HANDLE; APU BLEED VALVE; YEL HYD SYS NO LO PR; GRN HYD SYS NO LO PR; BLUE HYD SYS NO LO PR; ENG 2 FUEL LEVER; ENG 1 FUEL LEVER	SPEED BRAKE HANDLE; ECAM DISPLAY; ENG 2 FUEL LEVER; ENG 1 FUEL LEVER	SPEED BRAKE HANDLE; APU BLEED VALVE; YEL HYD SYS NO LO PR; GRN HYD SYS NO LO PR; BLUE HYD SYS NO LO PR; ENG 2 FUEL LEVER; ENG 1 FUEL LEVER	SPEED BRAKE HANDLE; ENG 2 FUEL LEVER; ENG 1 FUEL LEVER	24
25	STABILIZER POSITION 29,25 18	STABILIZER POSITION 29,25 18	STABILIZER POSITION 29,25 18	STABILIZER POSITION 29,25 18	25
26	THRUST CMD ENG 2 [N1] / [EPR] 27 22; THRUST CMD ENG 1 [N1] / [EPR] 27 22	RADIO HEIGHT RA 2 27 16	THRUST CMD ENG 2 [N1] / [EPR] 27 22; THRUST CMD ENG 1 [N1] / [EPR] 27 22	RADIO HEIGHT RA 2 27 16	26
27	SELECTED ALTITUDE (MANUAL) 28 19; TRAFFIC ALERT VIS ANN	SELECTED AIRSPEED (MANUAL) 28 20; TRAFFIC ALERT VIS ANN	AIRSPEED TARGET 28 20; TRAFFIC ALERT VIS ANN	SELECTED VERTICAL SPEED 29,27 21; SENSITIVITY LEVEL 17 15; TRAFFIC ALERT VIS ANN	27
28	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	28
29	PITCH ANGLE 29,27 20; SPOILER 3 LH RET; SPOILER 2 LH RET; SPOILER 1 LH RET	PITCH ANGLE 29,27 20; SPOILER 3 LH RET; SPOILER 2 LH RET; SPOILER 1 LH RET	PITCH ANGLE 29,27 20; SPOILER 3 LH RET; SPOILER 2 LH RET; SPOILER 1 LH RET	PITCH ANGLE 29,27 20; SPOILER 3 LH RET; SPOILER 2 LH RET; SPOILER 1 LH RET	29
30	RUDDER POSITION 29,26 18; AUTO THROTTLE MODE; MANUAL THROTTLE ARMD	RUDDER POSITION 29,26 18; AUTO THROTTLE MODE; MANUAL THROTTLE ARMD	RUDDER POSITION 29,26 18; AUTO THROTTLE MODE; MANUAL THROTTLE ARMD	RUDDER POSITION 29,26 18; AUTO THROTTLE MODE; MANUAL THROTTLE ARMD	30
31	ALL SPEED AILERON RH 29,26 18; ATS ARMING LEVER; LAND TRK	ALL SPEED AILERON RH 29,26 18; ATS ARMING LEVER; LAND TRK	ALL SPEED AILERON RH 29,26 18; ATS ARMING LEVER; LAND TRK	ALL SPEED AILERON RH 29,26 18; ATS ARMING LEVER; LAND TRK	31
32	FUEL FLOW ENG 2	FUEL FLOW ENG 2	FUEL FLOW ENG 2	FUEL FLOW ENG 2	32

BM6 31 32 00 0 DAXG-00

DFDR Word and Frame Assignment (Sheet 2/4)
Figure 001

R

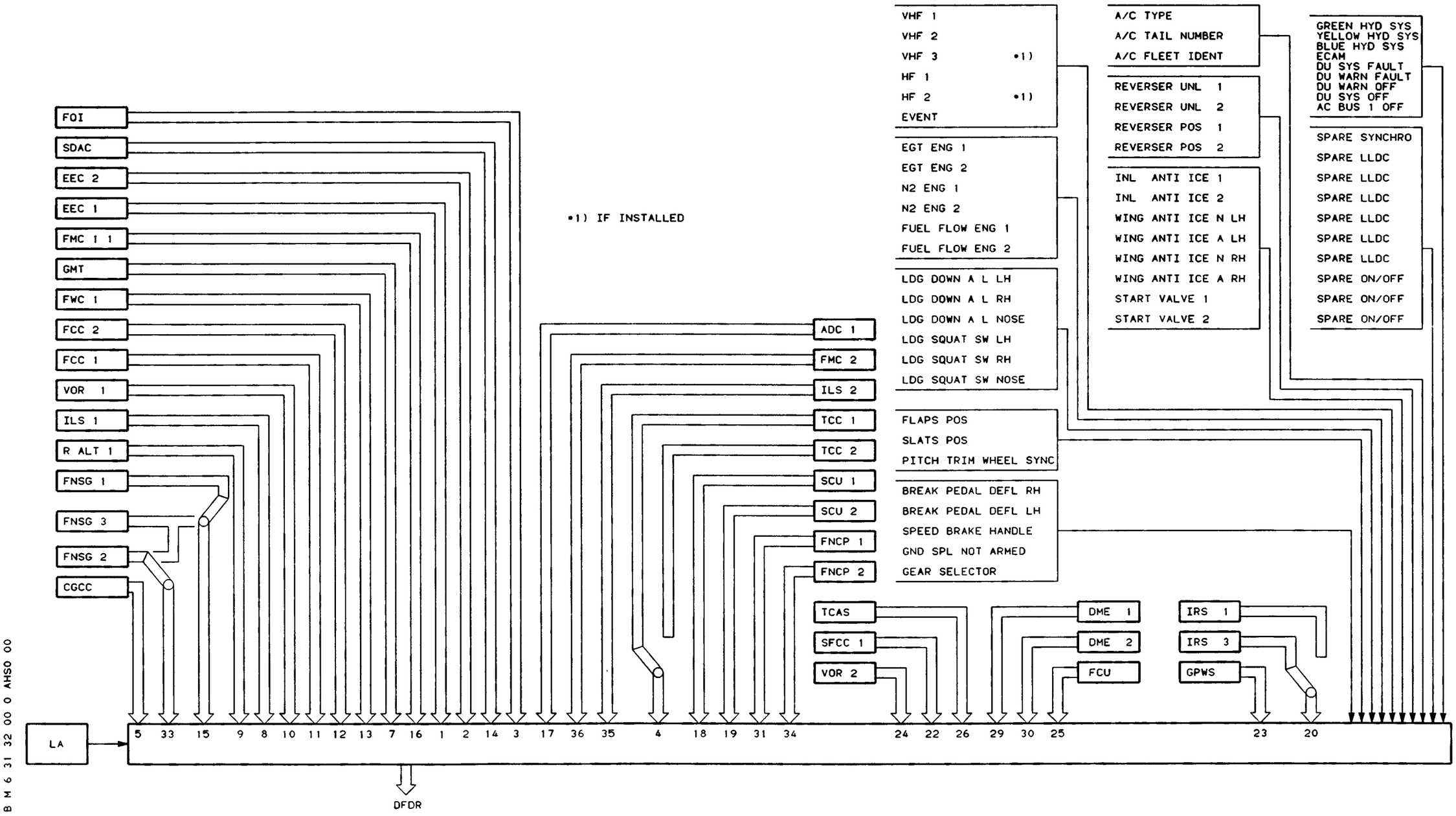
WORD NO	SUBFRAME 1 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 2 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 3 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 4 MSB BIT 12 INPUT BITS LSB BIT 1	WORD NO
33	LOCALIZER DEVIATION 1 29,28 20	LOCALIZER DEVIATION 2 29,28 20	LOCALIZER DEVIATION 1 29,28 20	LOCALIZER DEVIATION 2 29,28 20	33
34	GLIDE SLOPE DEVIATION 1 29,27 20 · MARKER BEACON PASSAGE	GLIDE SLOPE DEVIATION 2 29,27 20 · MARKER BEACON PASSAGE	GLIDE SLOPE DEVIATION 1 29,27 20 · MARKER BEACON PASSAGE	GLIDE SLOPE DEVIATION 2 29,27 20 · MARKER BEACON PASSAGE	34
35	ANGLE OF ATTACK (ADC 2) 29,27 20 · FD #2 · A/P CWS #2 · A/P CMD #2	ANGLE OF ATTACK (ADC 2) 29,27 20 · FD #2 · A/P CWS #2 · A/P CMD #2	ANGLE OF ATTACK (ADC 2) 29,27 20 · FD #2 · A/P CWS #2 · A/P CMD #2	ANGLE OF ATTACK (ADC 2) 29,27 20 · FD #2 · A/P CWS #2 · A/P CMD #2	35
36	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	36
37	BODY LONG ACCEL · VNAV MODE-PROFILE · ATS CLUT OFF	BODY LONG ACCEL · VNAV MODE-PROFILE · ATS CLUT OFF	BODY LONG ACCEL · VNAV MODE-PROFILE · ATS CLUT OFF	BODY LONG ACCEL · VNAV MODE-PROFILE · ATS CLUT OFF	37
38	BODY LATERAL ACCEL · MACH MODE ENGD · A/THR-THRUST MODE	BODY LATERAL ACCEL · MACH MODE ENGD · A/THR-THRUST MODE	BODY LATERAL ACCEL · MACH MODE ENGD · A/THR-THRUST MODE	BODY LATERAL ACCEL · MACH MODE ENGD · A/THR-THRUST MODE	38
39	ELEVATOR POSITION 29,26 18 · APU FIRE · GROUND SPOILER ARMED	ELEVATOR POSITION 29,26 18 · APU FIRE · GROUND SPOILER ARMED	ELEVATOR POSITION 29,26 18 · APU FIRE · GROUND SPOILER ARMED	ELEVATOR POSITION 29,26 18 · APU FIRE · GROUND SPOILER ARMED	39
40	EPR/N1 ENG 2 28 P&W 20 27 GE 19 · ALPHA FLOOR MODE · RETARD MODE ENGD · SPEED MODE ENGD	EPR/N1 ENG 2 28 P&W 20 27 GE 19 · ALPHA FLOOR MODE · RETARD MODE ENGD · SPEED MODE ENGD	EPR/N1 ENG 2 28 P&W 20 27 GE 19 · ALPHA FLOOR MODE · RETARD MODE ENGD · SPEED MODE ENGD	EPR/N1 ENG 2 28 P&W 20 27 GE 19 · ALPHA FLOOR MODE · RETARD MODE ENGD · SPEED MODE ENGD	40
41	DRIFT ANGLE 29,26 18 · X FEED VALVE	WIND DIRECTION 29,28 21 · DC NORMAL BUS OFF · AC BUS 2 OFF · AC BUS 1 OFF	WIND SPEED 28 21 · GEAR SELECTOR NOT UP · GEAR SELECTOR NOT DOWN · X FEED VALVE	SUPERFRAME 3	41
42	GROUND SPEED 26 17 · WIND-SHEAR WARNING · GPWS MODES	GROUND SPEED 26 17 · WIND-SHEAR WARNING · GPWS MODES	GROUND SPEED 26 17 · WIND-SHEAR WARNING · GPWS MODES	GROUND SPEED 26 17 · WIND-SHEAR WARNING · GPWS MODES	42
43	RESOLUTION ADVISORY 29 18	RESOLUTION ADVISORY 29 18	RESOLUTION ADVISORY 29 18	RESOLUTION ADVISORY 29 18	43
44	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	44
45	PITCH ANGLE 29,27 20 · SPOILER 2 FAULT · SPOILER 3+2 FAULT · SPOILER 4+1 FAULT	PITCH ANGLE 29,27 20 · SPOILER 2 FAULT · SPOILER 3+2 FAULT · SPOILER 4+1 FAULT	PITCH ANGLE 29,27 20 · SPOILER 2 FAULT · SPOILER 3+2 FAULT · SPOILER 4+1 FAULT	PITCH ANGLE 29,27 20 · SPOILER 2 FAULT · SPOILER 3+2 FAULT · SPOILER 4+1 FAULT	45
46	ROLL ANGLE 29,28 20 · SPOILER 5 FAULT · SPOILER 6 FAULT	ROLL ANGLE 29,28 20 · SPOILER 5 FAULT · SPOILER 6 FAULT	ROLL ANGLE 29,28 20 · SPOILER 5 FAULT · SPOILER 6 FAULT	ROLL ANGLE 29,28 20 · SPOILER 5 FAULT · SPOILER 6 FAULT	46
47	ALL SPEED AILERON LH 29,26 18 · ENG 2 FIRE · ENG 1 FIRE	ALL SPEED AILERON LH 29,26 18 · ENG 2 FIRE · ENG 1 FIRE	ALL SPEED AILERON LH 29,26 18 · ENG 2 FIRE · ENG 1 FIRE	ALL SPEED AILERON LH 29,26 18 · ENG 2 FIRE · ENG 1 FIRE	47
48	FUEL FLOW ENG 1	FUEL FLOW ENG 1	FUEL FLOW ENG 1	FUEL FLOW ENG 1	48

DFDR Word and Frame Assignment (Sheet 3/4)
Figure 001

R

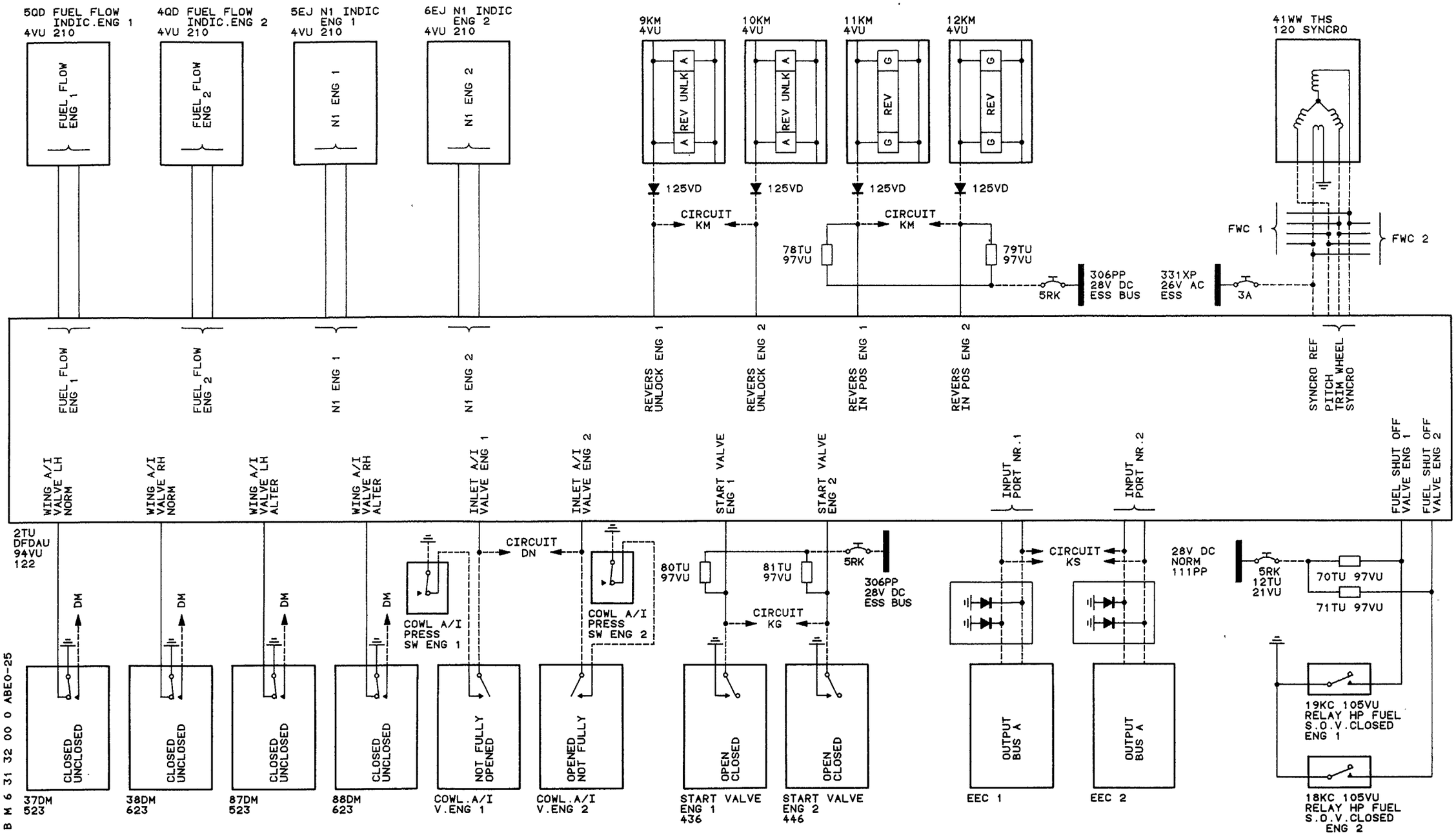
WORD NO	SUBFRAME 1 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 2 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 3 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 4 MSB BIT 12 — INPUT BITS — LSB BIT 1	WORD NO
49	ILS 1 FREQUENCY - WITHOUT BIT 18 - 27 — 15	VOR 1 FREQUENCY - WITHOUT BIT 18 - 27 — 15	ILS 2 FREQUENCY - WITHOUT BIT 18 - 27 — 15	VOR 2 FREQUENCY - WITHOUT BIT 18 - 27 — 15	49
50	THRUST TARGET [N1] / [EPR] 27 — 22	ECAM DU SYS OFF; ECAM DU SYS NO FAULT; ECAM DU WARN OFF; ECAM DU WARN NO FAULT	TIME MINUTES 23 — 18; TIME SECONDS 17 — 12	WING AI VALVE LH ALT; WING AI VALVE LH NORM; WING AI VALVE RH NORM; WING AI VALVE RH ALT	50
51	EGT ENG 1 (P&W) EGT IND ENG 1 (GE) 27 — 18	TOTAL AIR TEMPERATURE 29,26 — 18; PACK MAN MODE SEL 2; PACK MAN MODE SEL 1	SUPERFRAME 4	TOTAL AIR TEMPERATURE 29,26 — 18; PACK MAN MODE SEL 2; PACK MAN MODE SEL 1	51
52	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	52
53	BODY LONG ACCEL; VMO/MMO OVERSPD; SMOKE	BODY LONG ACCEL; VMO/MMO OVERSPD; SMOKE	BODY LONG ACCEL; VMO/MMO OVERSPD; SMOKE	BODY LONG ACCEL; VMO/MMO OVERSPD; SMOKE	53
54	BODY LATERAL ACCEL; GEAR NOT LOCKED DOWN; STALL	BODY LATERAL ACCEL; GEAR NOT LOCKED DOWN; STALL	BODY LATERAL ACCEL; GEAR NOT LOCKED DOWN; STALL	BODY LATERAL ACCEL; GEAR NOT LOCKED DOWN; STALL	54
55	ELEVATOR POSITION 29,26 — 18; EVENT; CABIN ALTITUDE	ELEVATOR POSITION 29,26 — 18; EVENT; CABIN ALTITUDE	ELEVATOR POSITION 29,26 — 18; EVENT; CABIN ALTITUDE	ELEVATOR POSITION 29,26 — 18; EVENT; CABIN ALTITUDE	55
56	SUPERFRAME 1	BEARING TO WP 29,28 — 21; INLET AI VALVE ENG 2; INLET AI VALVE ENG 1; FLAPS FAULT	PRES POS LAT FINE 20 — 10; START V POS ENG 2	FRAME COUNTER	56
57	SUPERFRAME 2	DFDAU BITE	PRES POS LONG FINE 21 — 11; START V POS ENG 1	SLATS FAULT; YAW DAMPER 2 FAULT; YAW DAMPER 1 FAULT; PITCH TRIM 2 FAULT; PITCH TRIM 1 FAULT; EEC 2 FAULT; EEC 1 FAULT; ALTITUDE COARSE 29,27 — 24	57
58	ALTITUDE FINE 24 — 14	ALTITUDE FINE 24 — 14	ALTITUDE FINE 24 — 14	ALTITUDE FINE 24 — 14	58
59	EGT ENG 2 (P&W) EGT IND ENG 2 (GE) 27 — 18	EVM FAN ENG 1 [N1] 28 — 23; EVM TURBINE ENG 1 [N2] 28 — 23	EVM FAN ENG 2 [N1] 28 — 23; EVM TURBINE ENG 2 [N2] 28 — 23	SELECTED MACH (MANUAL) 26 — 21; MACH TARGET 26 — 21	59
60	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	60
61	PITCH ANGLE 29,27 — 20; LDG SQUAT SW LH; LDG SQUAT SW NOSE; LDG SQUAT SW RH	PITCH ANGLE 29,27 — 20; LDG SQUAT SW LH; LDG SQUAT SW NOSE; LDG SQUAT SW RH	PITCH ANGLE 29,27 — 20; LDG SQUAT SW LH; LDG SQUAT SW NOSE; LDG SQUAT SW RH	PITCH ANGLE 29,27 — 20; LDG SQUAT SW LH; LDG SQUAT SW NOSE; LDG SQUAT SW RH	61
62	RUDDER POSITION 29,26 — 18; OVERSPD; CONFIGU-RATION	RUDDER POSITION 29,26 — 18; OVERSPD; CONFIGU-RATION	RUDDER POSITION 29,26 — 18; OVERSPD; CONFIGU-RATION	RUDDER POSITION 29,26 — 18; OVERSPD; CONFIGU-RATION	62
63	ALL SPEED AILERON RH 29,26 — 18; ENG 2 FAIL; ENG 1 FAIL	ALL SPEED AILERON RH 29,26 — 18; ENG 2 FAIL; ENG 1 FAIL	ALL SPEED AILERON RH 29,26 — 18; ENG 2 FAIL; ENG 1 FAIL	ALL SPEED AILERON RH 29,26 — 18; ENG 2 FAIL; ENG 1 FAIL	63
64					64

DFDR Word and Frame Assignment (Sheet 4/4)
Figure 001

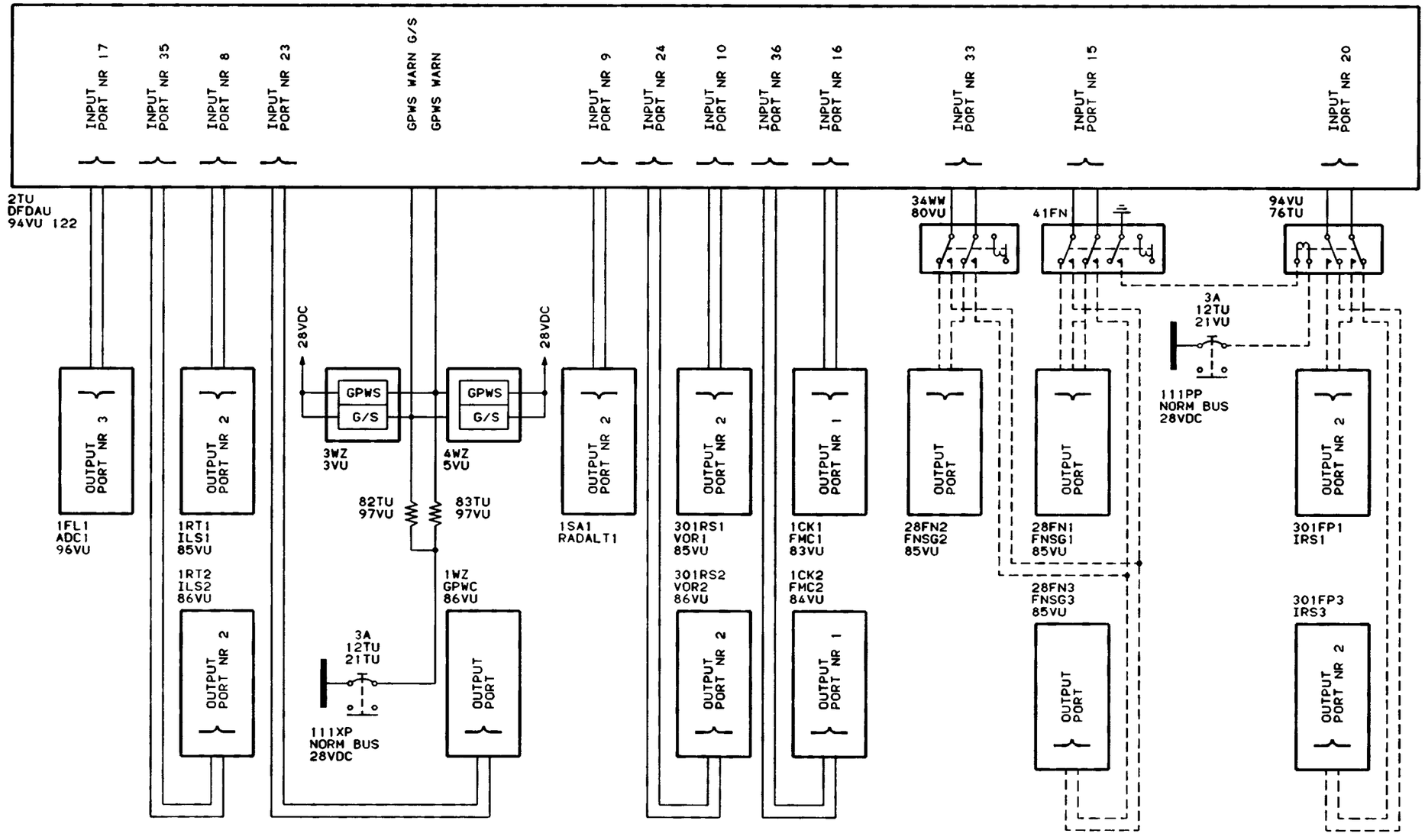


AIDS Parameter Sources Block Diagram
Figure 002

R



AIDS DFDAU Inputs
Figure 003

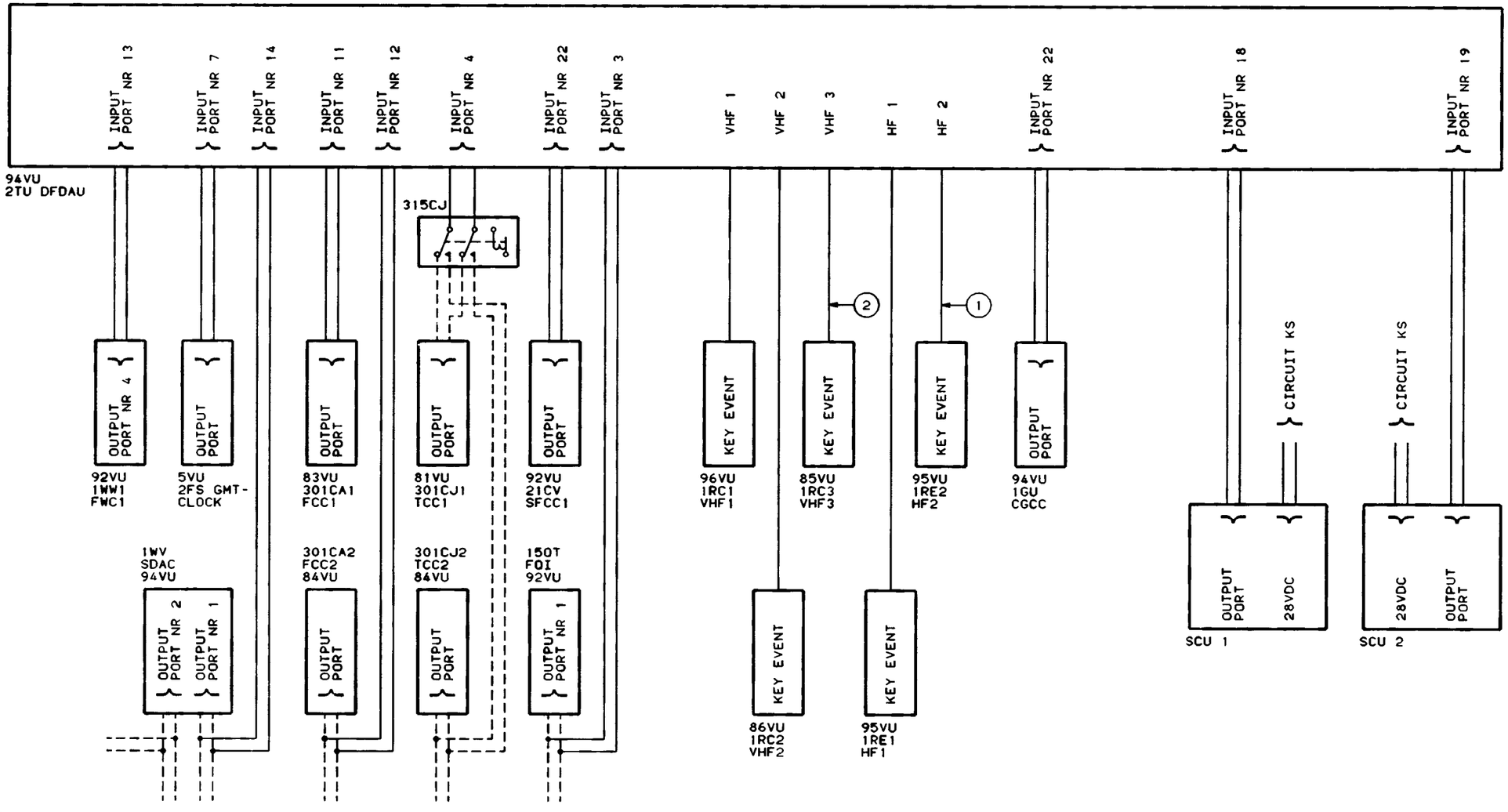


B M 6 31 32 00 0 AGJ0 00

AIDS DFDAU Inputs
Figure 004

EFFECTIVITY: 101-200,

PIA



B M 6 31 32 00 0 AGW0 00

(1) INSTALLATION OF WIRE ONLY IF MOD 3205 IS APPLICABLE

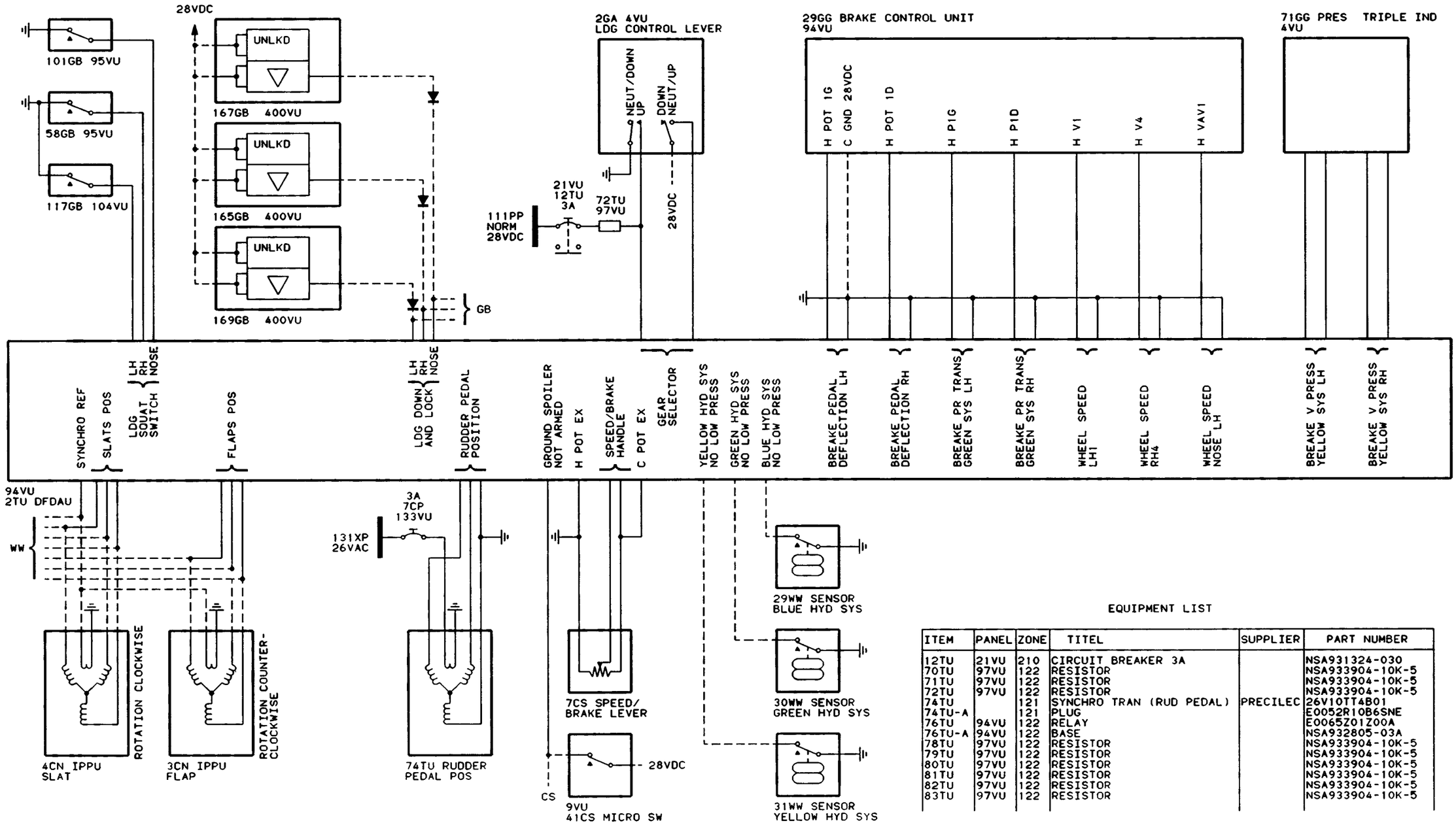
(2) INSTALLATION OF WIRE ONLY IF MOD 2951 IS APPLICABLE AND IF ACARS IS NOT INSTALLED

AIDS DFDAU Inputs
Figure 005

EFFECTIVITY: 101-200,

PIA

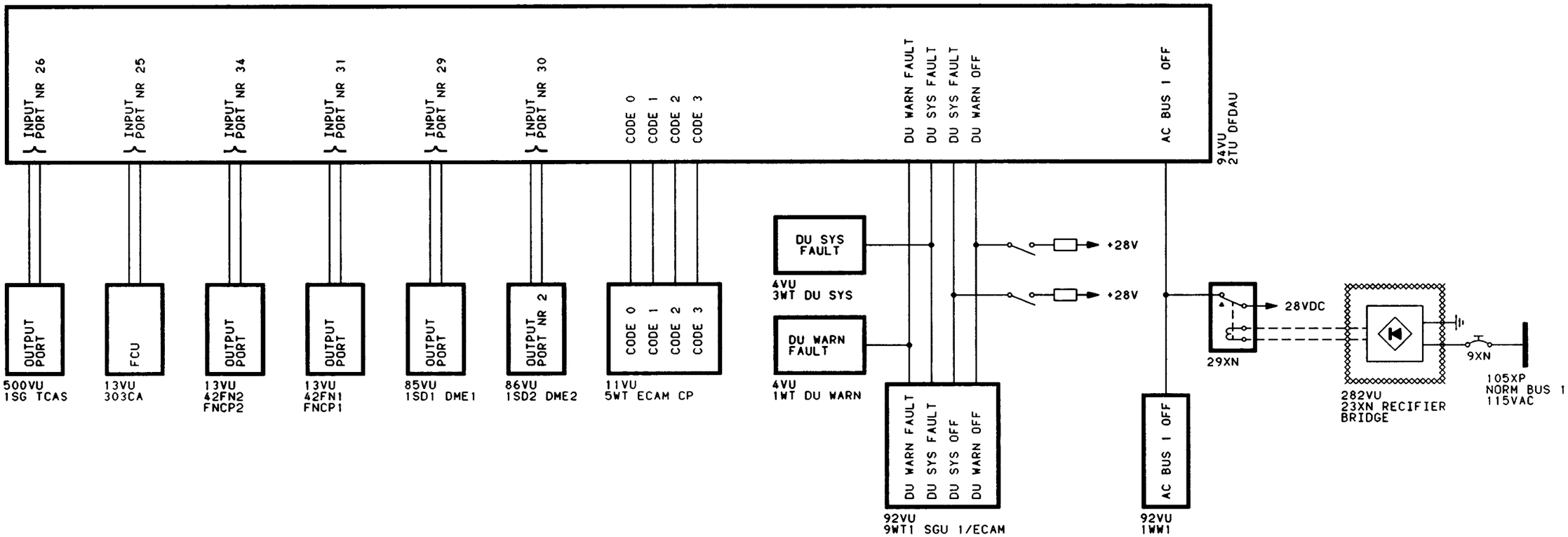
Printed in France



EQUIPMENT LIST

ITEM	PANEL	ZONE	TITEL	SUPPLIER	PART NUMBER
12TU	21VU	210	CIRCUIT BREAKER 3A		NSA931324-030
70TU	97VU	122	RESISTOR		NSA933904-10K-5
71TU	97VU	122	RESISTOR		NSA933904-10K-5
72TU	97VU	122	RESISTOR		NSA933904-10K-5
74TU		121	SYNCHRO TRAN (RUD PEDAL)	PRECILEC	26V10TT4B01
74TU-A		121	PLUG		E0052R10B6SNE
76TU	94VU	122	RELAY		E0065Z01Z00A
76TU-A	94VU	122	BASE		NSA932805-03A
78TU	97VU	122	RESISTOR		NSA933904-10K-5
79TU	97VU	122	RESISTOR		NSA933904-10K-5
80TU	97VU	122	RESISTOR		NSA933904-10K-5
81TU	97VU	122	RESISTOR		NSA933904-10K-5
82TU	97VU	122	RESISTOR		NSA933904-10K-5
83TU	97VU	122	RESISTOR		NSA933904-10K-5

AIDS DFDAU Inputs
Figure 006



B M 6 31 32 00 0 AKC0 01

AIDS DFDAU Inputs
Figure 007

EFFECTIVITY: 101-200,

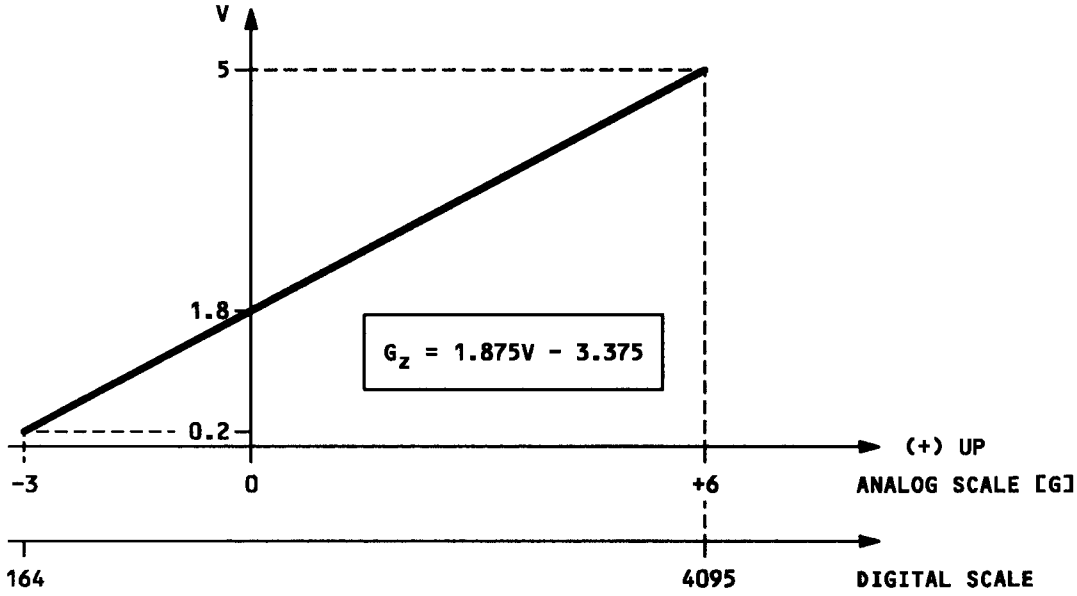
PIA

- status for discrete parameters.

PARAMETER NO : M05.01
NAME : BODY NORMAL ACCELERATION

ACCELERATION [G]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
-	0.000	ZERO COUNT	0	0
-3	0.200		164	164
0	1.800		1474	1474
+1	2.333		1911	1911
+6	5.000	FULL COUNT	4095	4095

SIGNAL CHARACTERISTIC: LINEAR



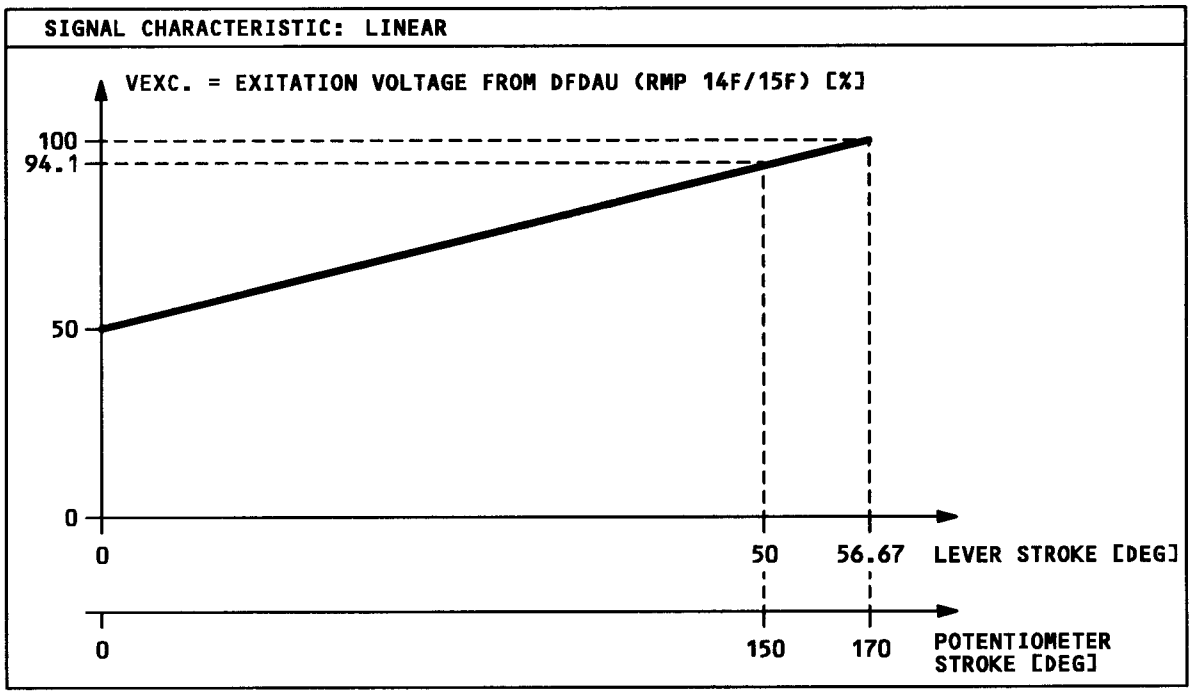
BM6 31 32 00 0 FBA0 00

R

Diagram
Figure 008

PARAMETER NO : M13.21
NAME : SPEED BRAKE HANDLE

LEVER SROKE [DEG]	POTENTIOMETER STROKE [DEG]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
-	-170	0% VEXC.	ZERO COUNT	0	0
-	-150			4	241
0	0	50% VEXC.	HALF COUNT	31	2047
50	+150	94.1% VEXC.		59	3855
56.67	+170	100% VEXC.	FULL COUNT	63	4095

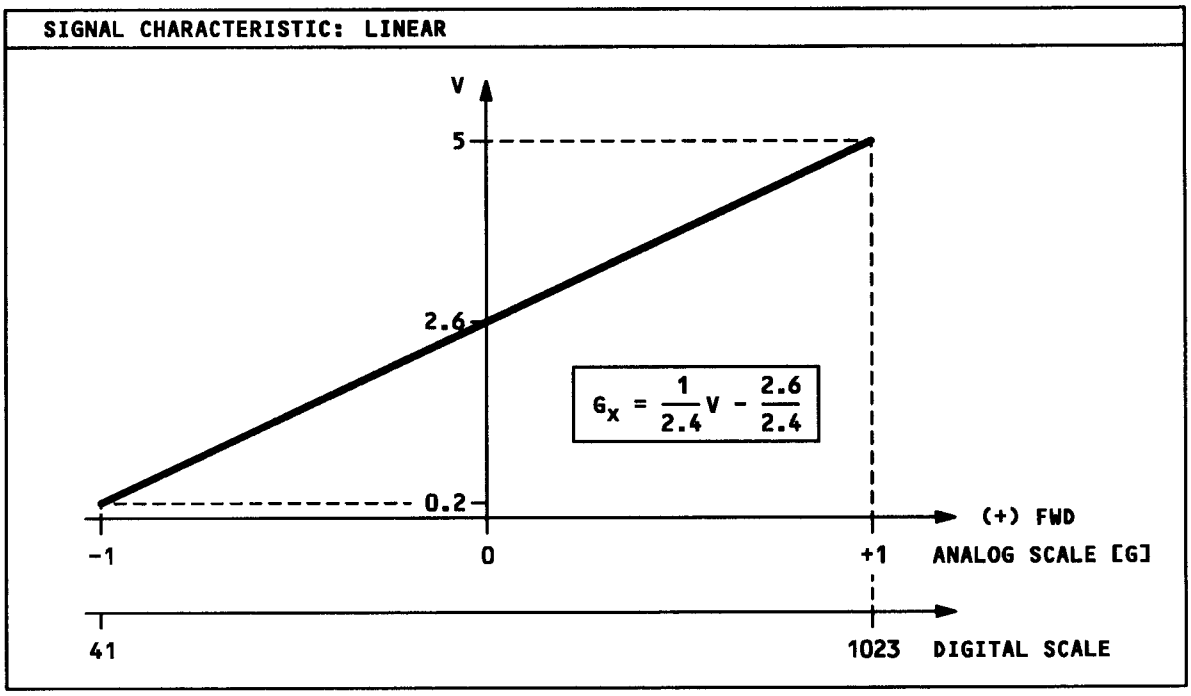


BM6 31 32 00 0 FBF0 00

R Diagram
Figure 009

PARAMETER NO : M16.01
NAME : BODY LONGITUDINAL ACCELERATION

ACCELERATION [G]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
-	0.000	ZERO COUNT	0	0
-1	0.200		41	164
0	2.600		532	2129
+1	5.000	FULL COUNT	1023	4095



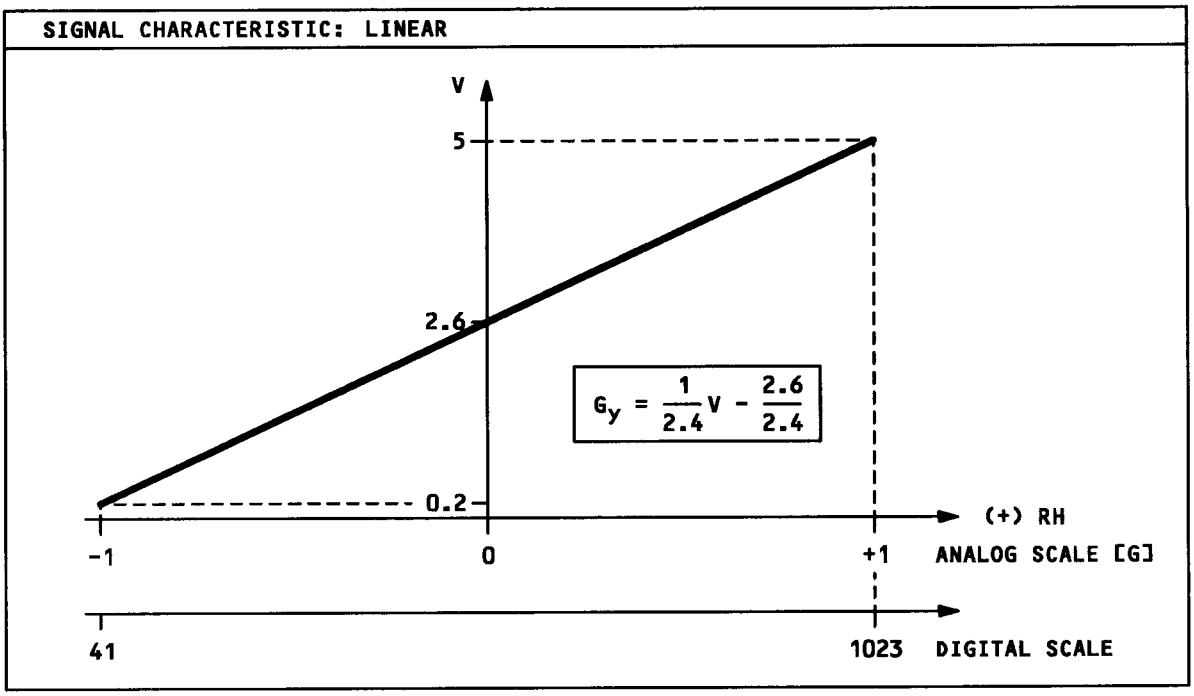
BM6 31 32 00 0 FBG0 00

R

Diagram
Figure 010

PARAMETER NO : M17.01
NAME : BODY LATERIAL ACCELERATION

ACCELERATION [G]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
-	0.000	ZERO COUNT	0	0
-1	0.200		41	164
0	2.600		532	2129
+1	5.000	FULL COUNT	1023	4095



BM6 31 32 00 0 FBH0 00

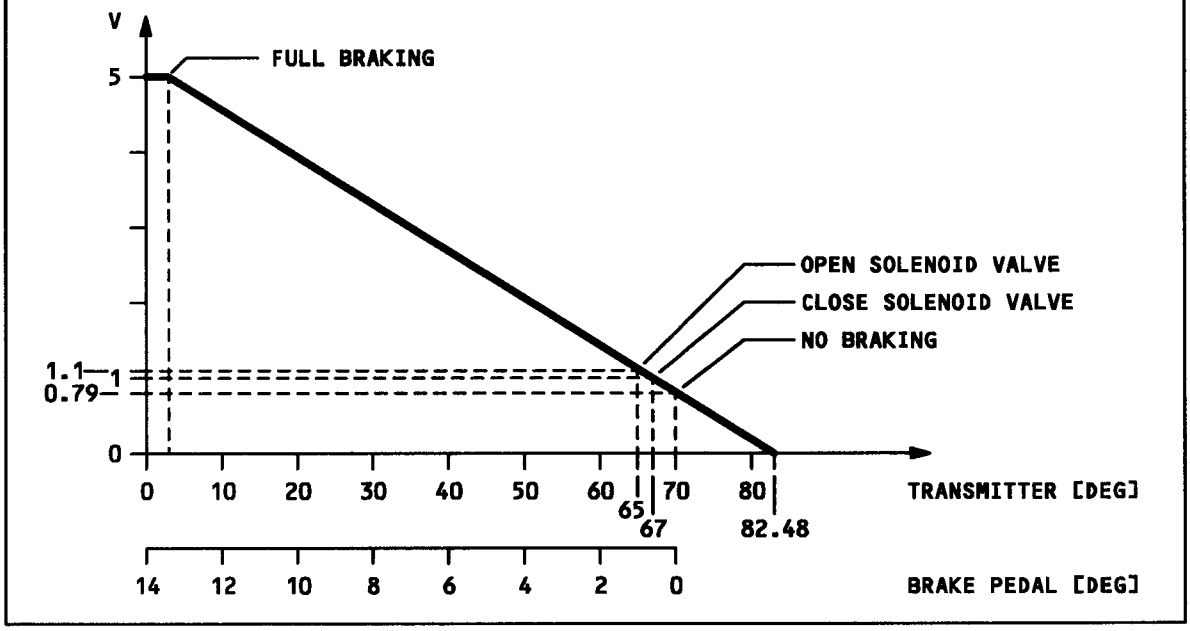
R

Diagram
Figure 011

PARAMETER NO : R02.01, R02.02
NAME : BRAKE PEDAL DEFLECTION (RH, LH)

PEDAL POSITION [DEG]	TRANSMITTER POSITION [DEG]	INPUT VOLTAGE [V]	BRAKING	DFDR DIGITAL VALUE	DFDR DIGITAL VALUE
-	82.48	0		0	0
0	70	0.79	NO BRAKING	10	647
0.6	67	1.00		13	819
1	65	1.10		14	901
13.4	3	5.00	FULL BRAKING	63	4095
14	0	5.00		63	4095

SIGNAL CHARACTERISTIC:



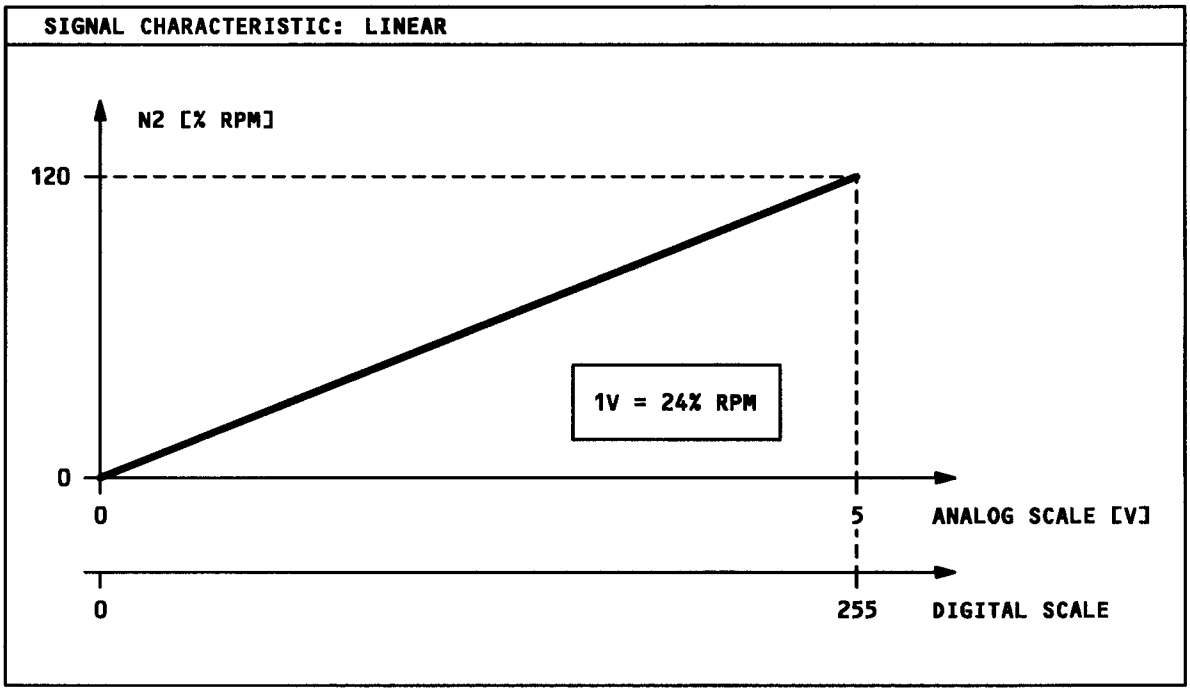
BM6 31 32 00 0 FBJ0 00

Diagram
Figure 012

R

PARAMETER NO : R03A01, R03A02
NAME : N2 (ENG1, ENG2)

N2 [% RPM]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
0	0.000	ZERO COUNT	0	0
120	5.000	FULL COUNT	255	4095



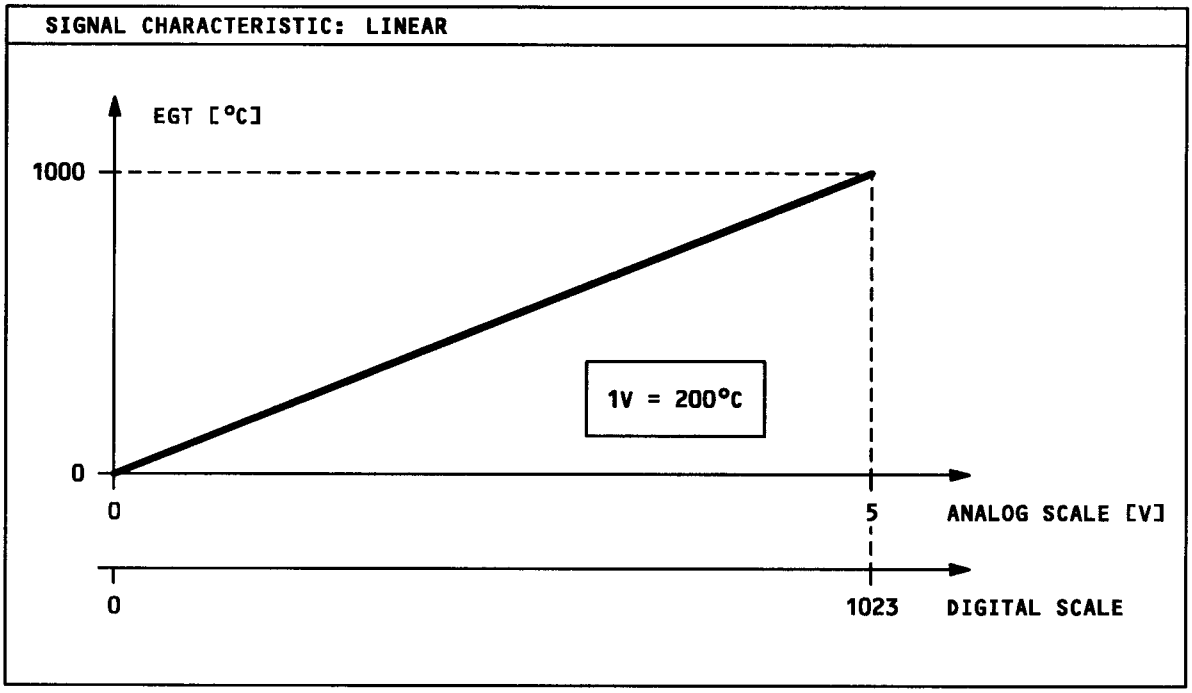
BM6 31 32 00 0 FBK0 00

R

Diagram
Figure 013

PARAMETER NO : R03B01, R03B02
NAME : EGT (ENG1, ENG2)

EGT [DEG]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
0	0.000	ZERO COUNT	0	0
1000	5.000	FULL COUNT	1023	4095



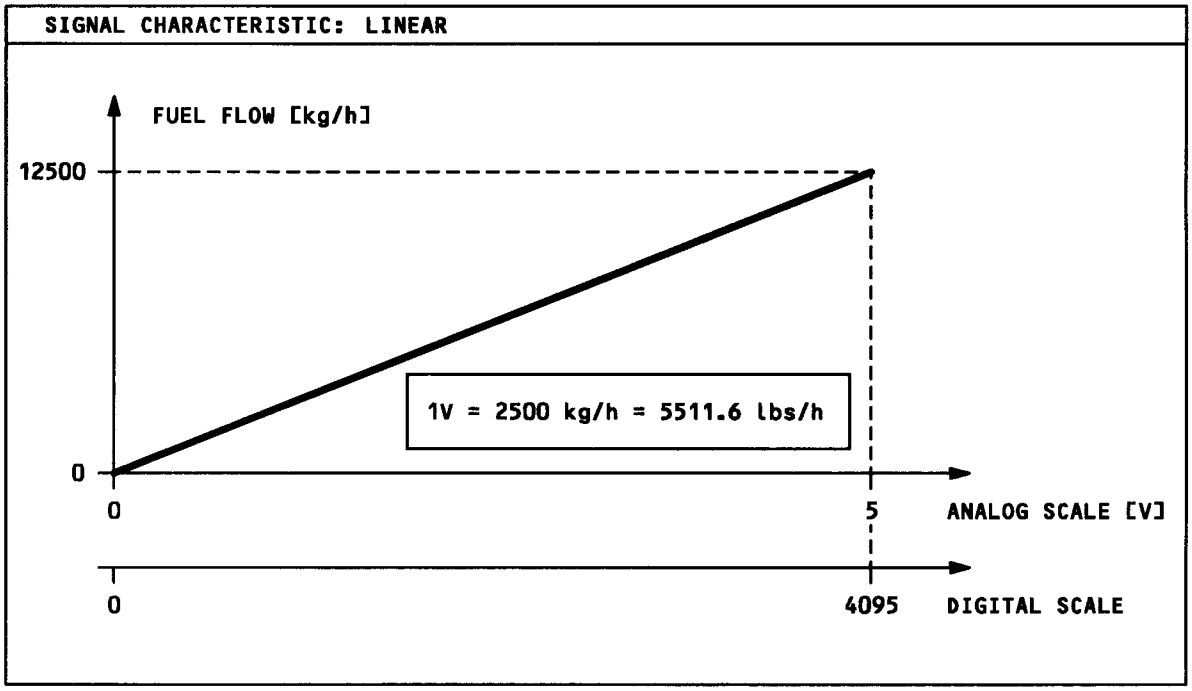
BM6 31 32 00 0 FBLO 00

R

Diagram
Figure 014

PARAMETER NO : R03C01, R03C02
NAME : FUEL FLOW (ENG1, ENG2)

FUEL FLOW [kg/h]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
0	0.000	ZERO COUNT	0	0
12500	5.000	FULL COUNT	4095	4095



BM6 31 32 00 0 FBM0 00

R

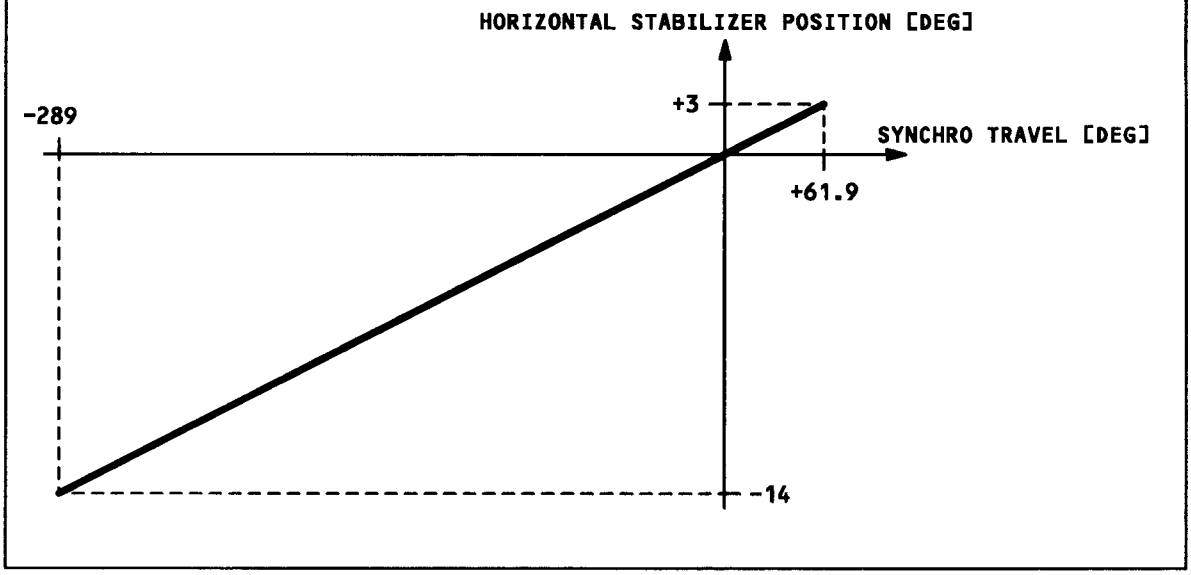
Diagram
Figure 015

PARAMETER NO : 169
NAME : PITCH TRIM WHEEL SYNCHRO *)

STABILIZER POSITION [DEG]	SYNCHRO TRAVEL [DEG]	SYNCHRO [DEG]	AD CONVERSION COUNT	DFDAU OUTPUT DIGITAL VALUE
+3	+61.9	+61.9		704
0	0	0	ZERO COUNT	0
-14	-289	+71		808
-	+360	+360	FULL COUNT	4095

*) PARAMETER NOT RECORDED ON DFDR!

SIGNAL CHARACTERISTIC: LINEAR



BM6 31 32 00 0 FBN0 00

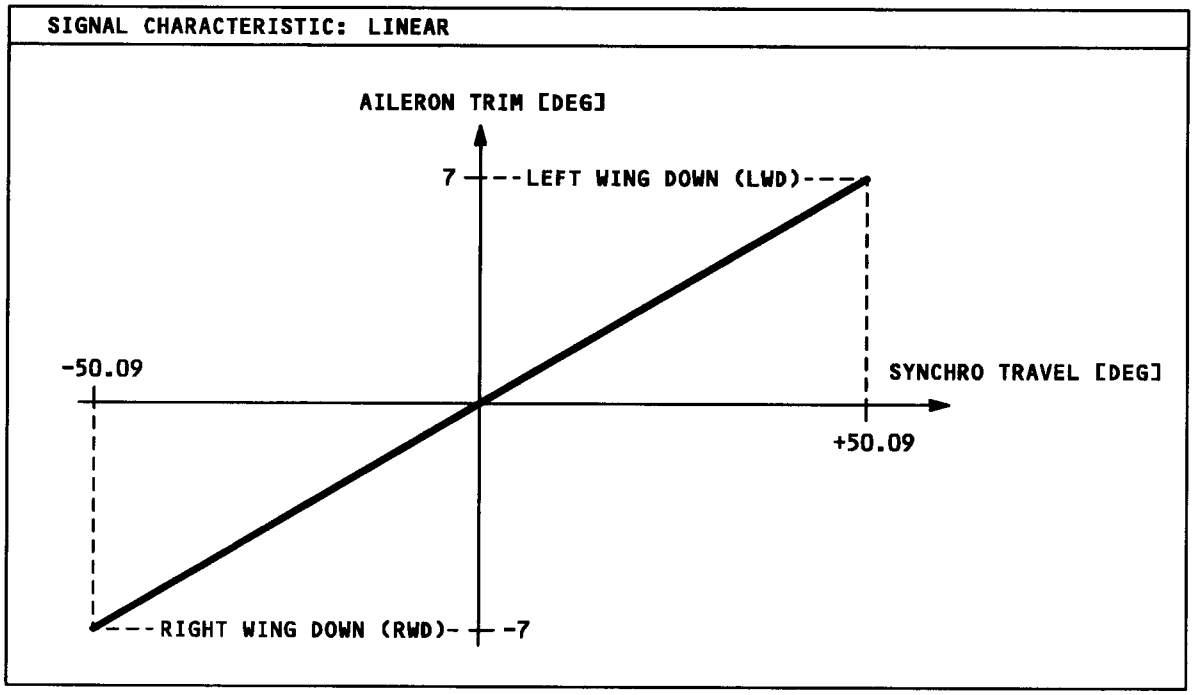
Diagram
Figure 016

R

PARAMETER NO : 402
NAME : AILERON TRIM *)

AILERON TRIM [DEG]	SYNCHRO TRAVEL [DEG]	SYNCHRO [DEG]	AD CONVERSION COUNT	DFDAU OUTPUT DIGITAL VALUE
-7 RWD	+309.91	-50.09		3526
0	0	0	ZERO COUNT	0
7 LWD	+50.09	+50.09		570
-	+360	+360	FULL COUNT	4095

*) PARAMETER NOT RECORDED ON DFDR!



BM6 31 32 00 0 FBP0 00

R

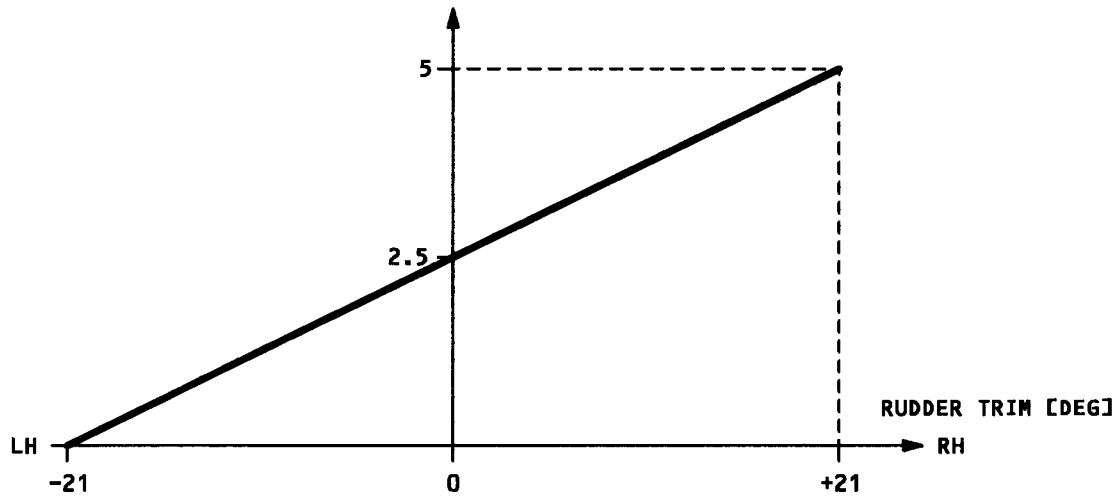
Diagram
Figure 017

PARAMETER NO : 403
NAME : RUDDER TRIM *)

RUDDER TRIM [DEG]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDAU OUTPUT DIGITAL VALUE
-21 LH (NOSE)	0	ZERO COUNT	0
0	+2.5		2047
21 RH (NOSE)	+5.0	FULL COUNT	4095

*) PARAMETER NOT RECORDED ON DFDR!

SIGNAL CHARACTERISTIC: LINEAR



BM6 31 32 00 0 FBQ0 00

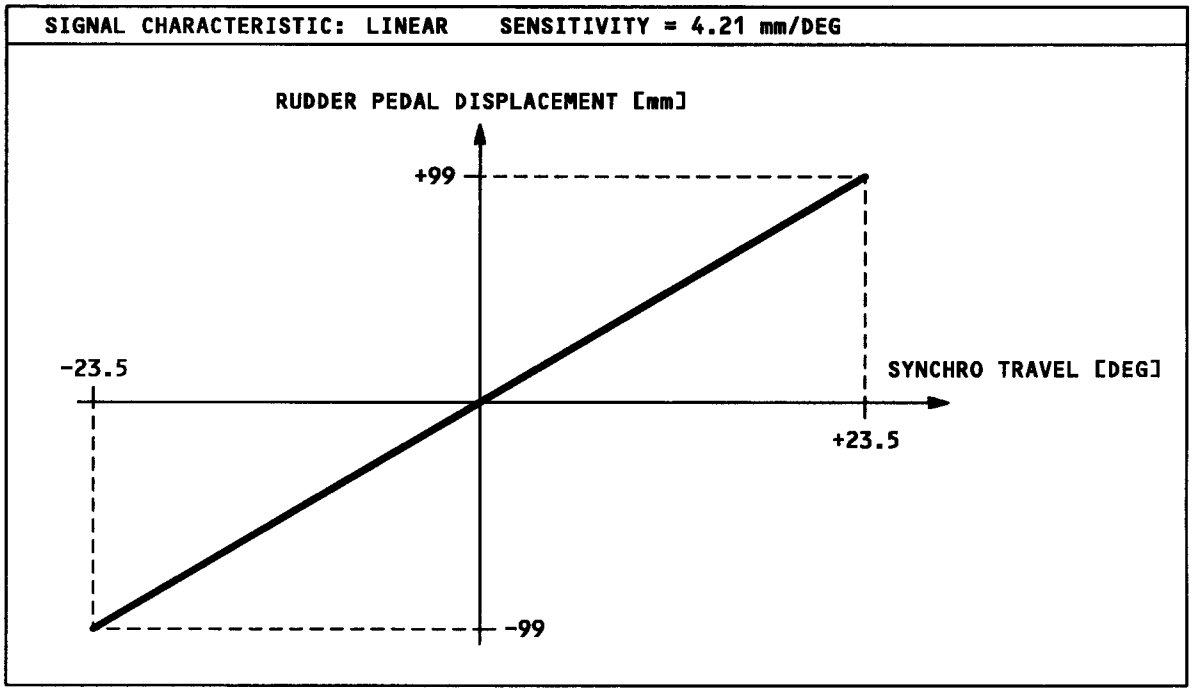
R

Diagram
Figure 018

PARAMETER NO : 440
NAME : RUDDER PEDAL POSITION *)

PEDAL DISPLACEMENT [mm]	SYNCHRO TRAVEL [DEG]	SYNCHRO [DEG]	AD CONVERSION COUNT	DFDAU OUTPUT DIGITAL VALUE
-99	-23.5	+336.5		3828
0	0	0	ZERO COUNT	0
+99	+23.5	+23.5		268
-	+360	+360	FULL COUNT	4095

*) PARAMETER NOT RECORDED ON DFDR!



BM6 31 32 00 0 FBR0 00

R

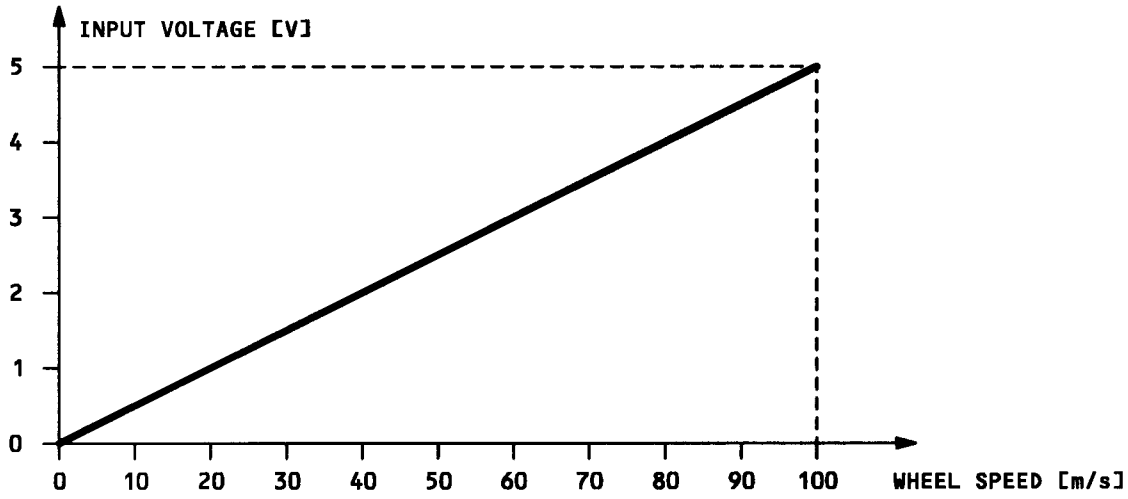
Diagram
Figure 019

PARAMETER NO : 465
NAME : WHEEL SPEED RH 8 *)

WHEEL SPEED [m/s]	INPUT VOLTAGE [V]	AD CONVERSION COUNT	DFDAU OUTPUT DIGITAL VALUE
0	0	ZERO COUNT	0
100	+5	FULL COUNT	4095

*) PARAMETER NOT RECORDED ON DFDR!

SIGNAL CHARACTERISTIC: LINEAR



BM6 31 32 00 0 FBS0 00

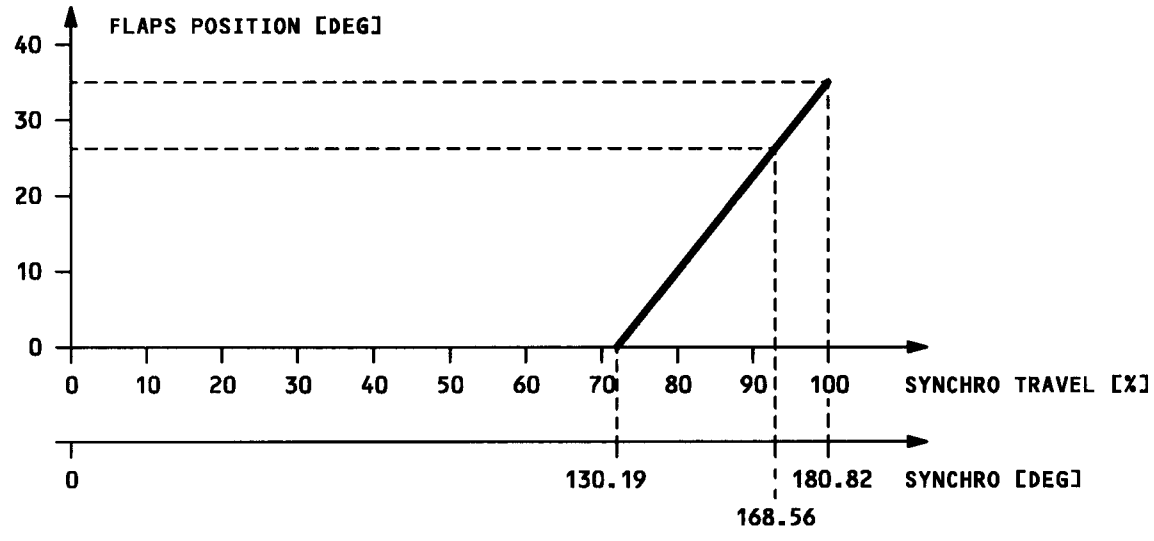
R

Diagram
Figure 020

PARAMETER NO : M10.01
NAME : FLAPS POSITION

FLAPS [DEG]	SYNCHRO [DEG]	SYNCHRO TRAVEL [%]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
-	0	0	ZERO COUNT	0	0
0	130.19	72		92	1481
1	134.17	74.2		95	1527
2	137.02	75.78		97	1559
3	138.78	76.75		98	1579
4	140.15	77.51		99	1595
5	141.51	78.26		100	1610
8.25	145.25	80.33		102	1653
17.5	157.24	86.96		111	1789
26	168.56	93.22		119	1918
33.5	178.76	98.96		126	2034
35	180.82	100		128	2057
-	360	-	FULL COUNT	255	4095

SIGNAL CHARACTERISTIC:



BM6 31 32 00 0 FBB0 00

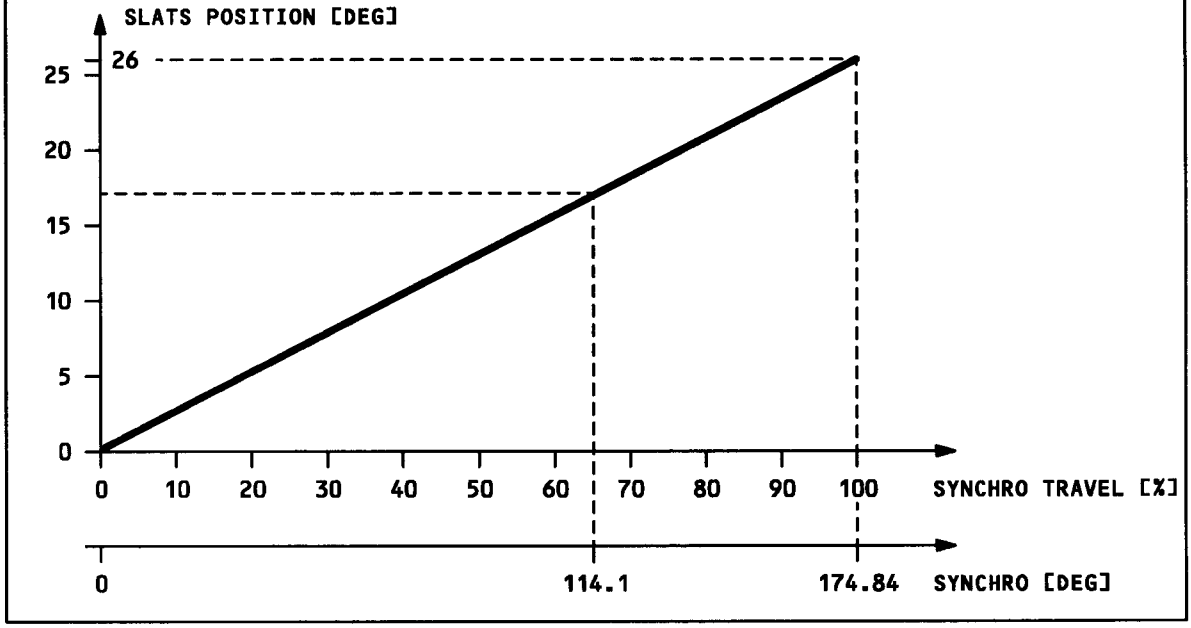
Diagram
Figure 021

R

PARAMETER NO : M11.01
NAME : SLATS POSITION

SLATS [DEG]	SYNCHRO [DEG]	SYNCHRO TRAVEL [%]	AD CONVERSION COUNT	DFDR DIGITAL VALUE	DFDAU OUTPUT DIGITAL VALUE
0	0	0	ZERO COUNT	0	0
17	114.10	65.26		80	1298
25	168.15	96.17		119	1913
26	174.84	100		123	1989
-	360	-	FULL COUNT	255	4095

SIGNAL CHARACTERISTIC:



BM6 31 32 00 0 FBD0 00

R

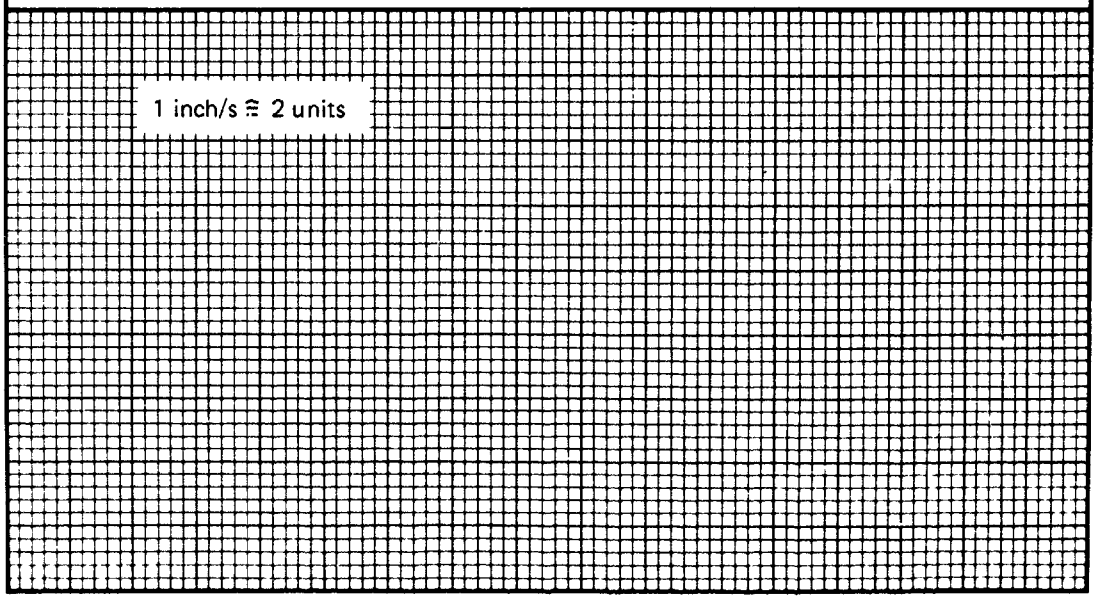
Diagram
Figure 022

Parameter No: 112 **Name:** EVM FAN ENG 1

Signal Type: ARINC 429

Vibration value	Dig. units - 429	DFDR Dig. value	Dig. value 429 outp.		
0 inch/s	0 units	0	0		
6.4 inch/s	12.8 units	1020	255		

Signal Characteristic: Linear



BM6 31 32 00 0BA W0-12

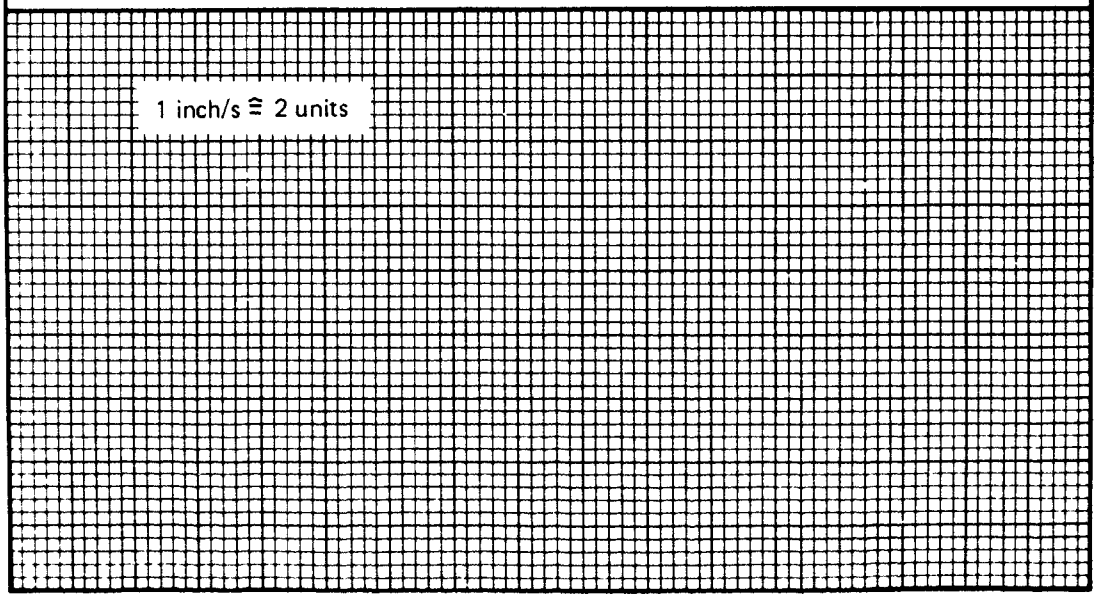
Diagram
Figure 023

Parameter No: 113 **Name:** EVM FAN ENG 2

Signal Type: ARINC 429

Vibration value	Dig. value 429	DFDR Dig. value	Dig. value 429 outp.		
0 inch/s	0 units	0	0		
6.4 inch/s	12.8 units	1020	255		

Signal Characteristic: Linear



BM6 31 32 00 0BA X 0-12

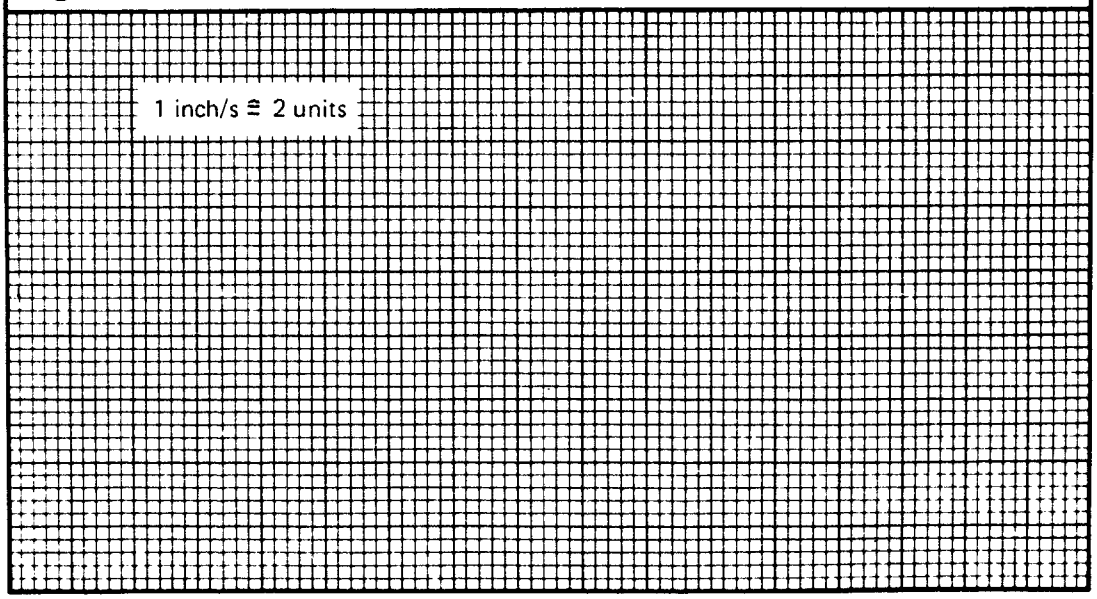
Diagram
Figure 024

Parameter No: 114 **Name:** EVM TURBINE ENG 1

Signal Type: ARINC 429

Vibration valve	Dig. units 429	DFDR Dig. value	Dig. value 429 outp.		
0 inch/s	0 units	0	0		
6.4 inch/s	12.8 units	1020	255		

Signal Characteristic: Linear



BM6 31320 0 BA Y 0–12

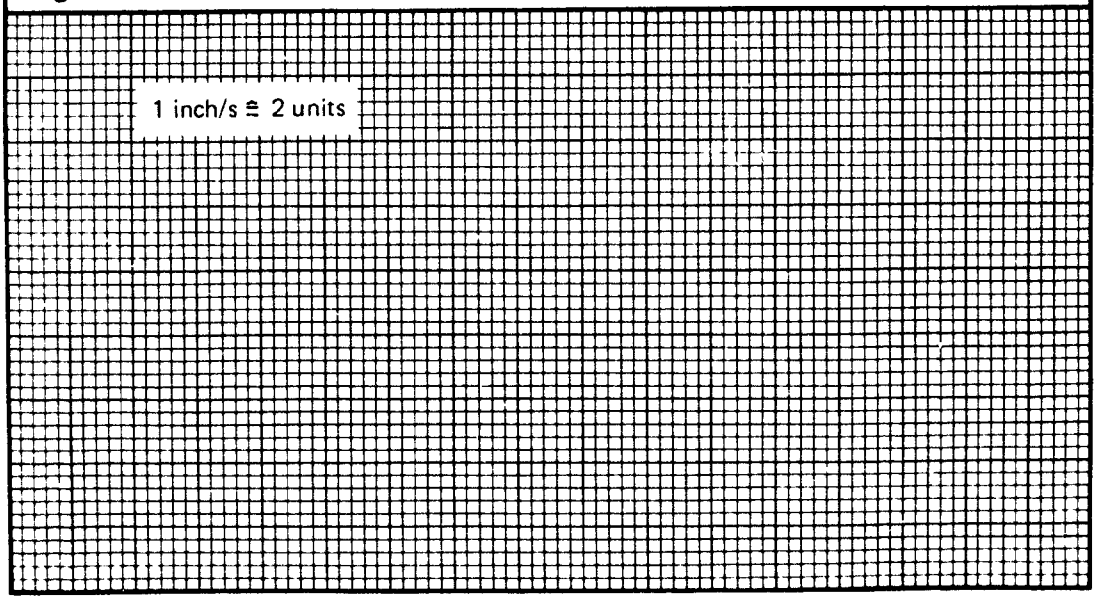
Diagram
Figure 025

Parameter No: 115 **Name:** EVM TURBINE ENG 2

Signal Type: ARINC 429

Vibration valve	Dig. units - 429	DFDR Dig. value	Dig. value 429 outp.		
0 inch/s	0 units	0	0		
6.4 inch/s	12.8 units	1020	255		

Signal Characteristic: Linear



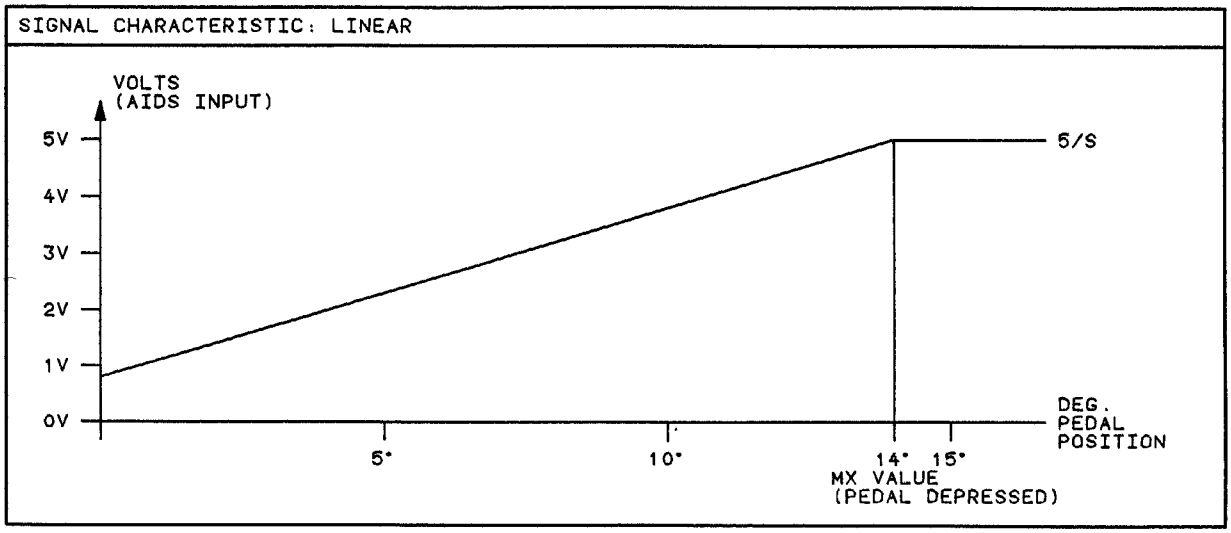
BM6 31 32 00 0BA Z0-12

Diagram
Figure 026

PARAMETER NO: 284
SIGNAL TYPE: LLDC 0-5V

NAME: BRAKE PEDAL DEFLECTION LH

PEDAL POSITION	TRANSMITTER POSITION	INPUT VOLTAGE	BREAKING	VALVE SOLENOID	VALVE MASTER	DFDR DIG.VALUE	DFDAU DIG.VALUE-429
	83.1 DEG	0.00V	-	CLOSE		0	0
0 DEG	70.0 DEG	0.79V	NO BREAKING	CLOSE		184	736
	67.0 DEG	0.98V		CLOSE		201	804
	65.0 DEG	1.10V		OPEN	0 BAR MV	225	900
14 DEG	0.00 DEG	5.00V	FULL BREAKING	OPEN	MAX BAR MV	1023	4095



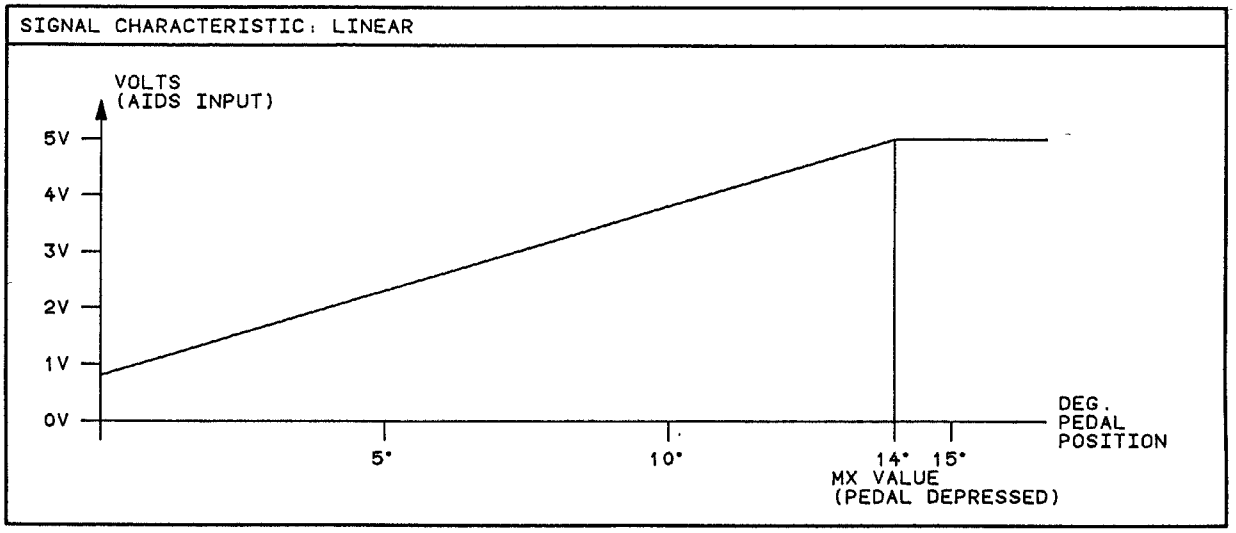
BM6 31 32 00 0 BBL0 00 / 29

Diagram
Figure 027

PARAMETER NO: 285
SIGNAL TYPE: LLDC 0-5V

NAME: BRAKE PEDAL DEFLECTION RH

PEDAL POSITION	TRANSMITTER POSITION	INPUT VOLTAGE	BREAKING	VALVE SOLENOID	VALVE MASTER	DFDR DIG.VALUE	DFDAU DIG.VALUE-429
	83.1 DEG	0.00V	-	CLOSE		0	0
0 DEG	70.0 DEG	0.79V	NO BREAKING	CLOSE		184	736
	67.0 DEG	0.98V		CLOSE		201	804
	65.0 DEG	1.10V		OPEN	0 BAR MV	225	900
14 DEG	0.00 DEG	5.00V	FULL BREAKING	OPEN	MAX BAR MV	1023	4095



BM6 31 32 00 0 BBM0 00 / 29

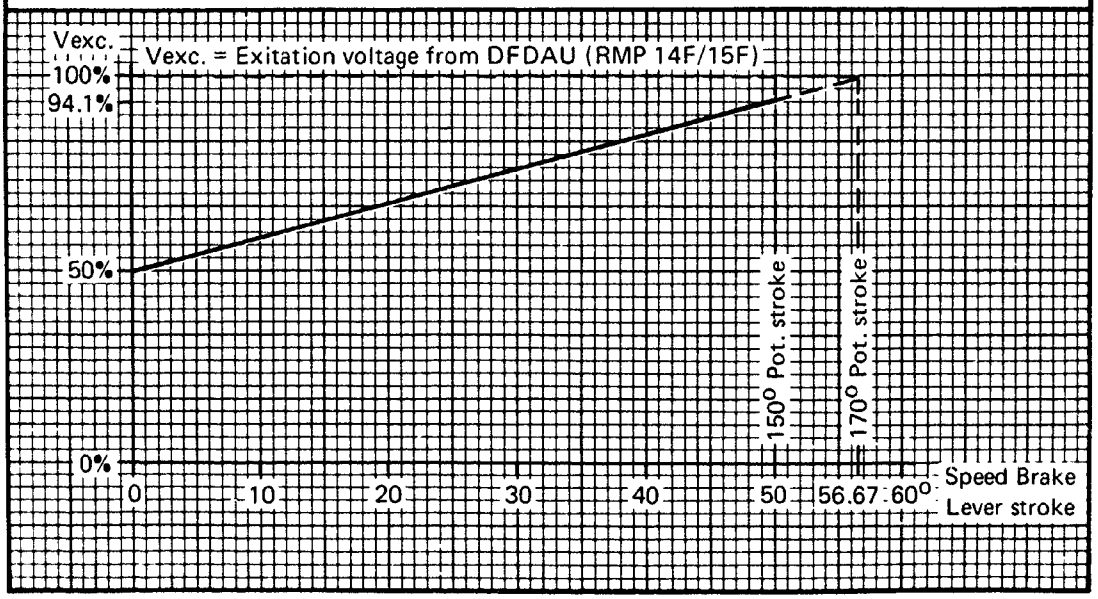
Diagram
Figure 028

Parameter No: 287 **Name:** SPEED BRAKE HANDLE

Signal Type: POT 1KΩ

Lever stroke	Potentiom. stroke	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU-output Dig. value - 429
–	–170°	0% Vexc.	zero count	0	0
–	–150°			60	241
0°	0°	50% Vexc.	half count	511	2047
50°	+150°			964	3855
56.67°	+170°	100% Vexc.	full count	1023	4095

Signal Characteristic:



BM6 31320 0BB N0-12

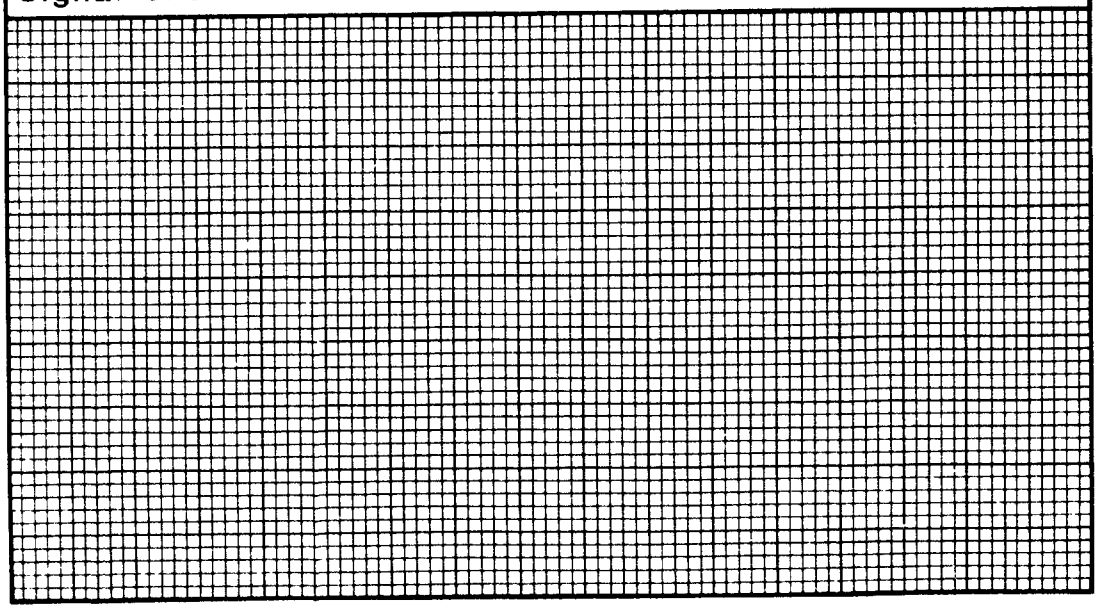
Diagram
Figure 029

Parameter No: 400 Name: N1 ENG 1 (P & W)

Signal Type: LLDC 0–5V

N1	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU–output Dig. value –429	
0% rpm	0V	zero count	0		
120% rpm	5V	full count	4095		

Signal Characteristic: Linear



BM6 31320 0BB R0–12

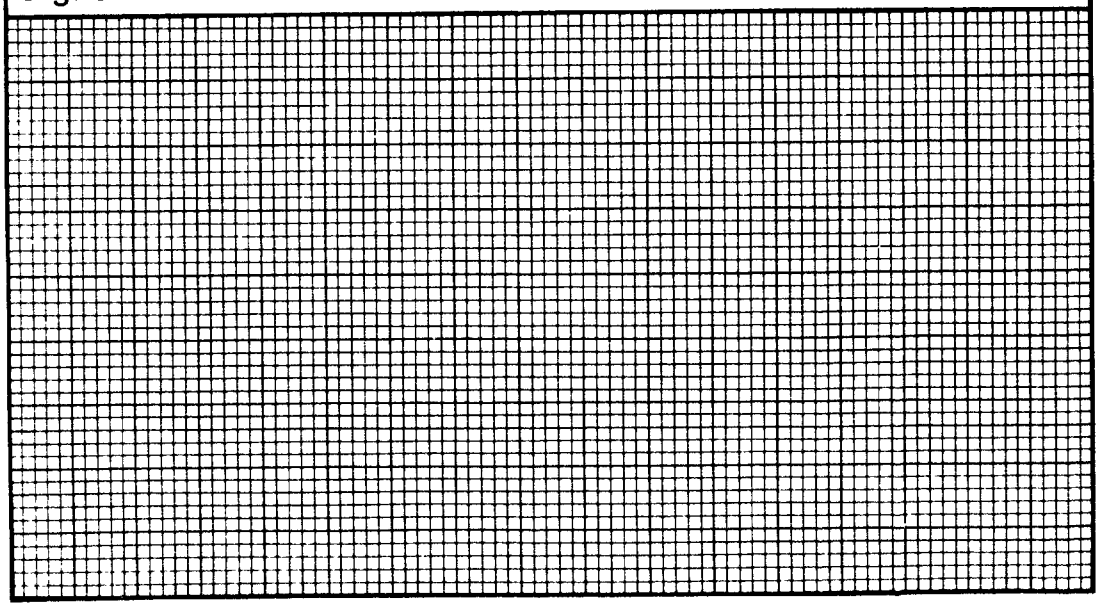
Diagram
Figure 030

Parameter No: 401 **Name:** N1 ENG 2 (P & W)

Signal Type: LLDC 0–5V

N1	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value –429	
0% rpm	0V	zero count	0		
120% rpm	5V	full count	4095		

Signal Characteristic: Linear



BM6 31 32 00 0BBS0-12

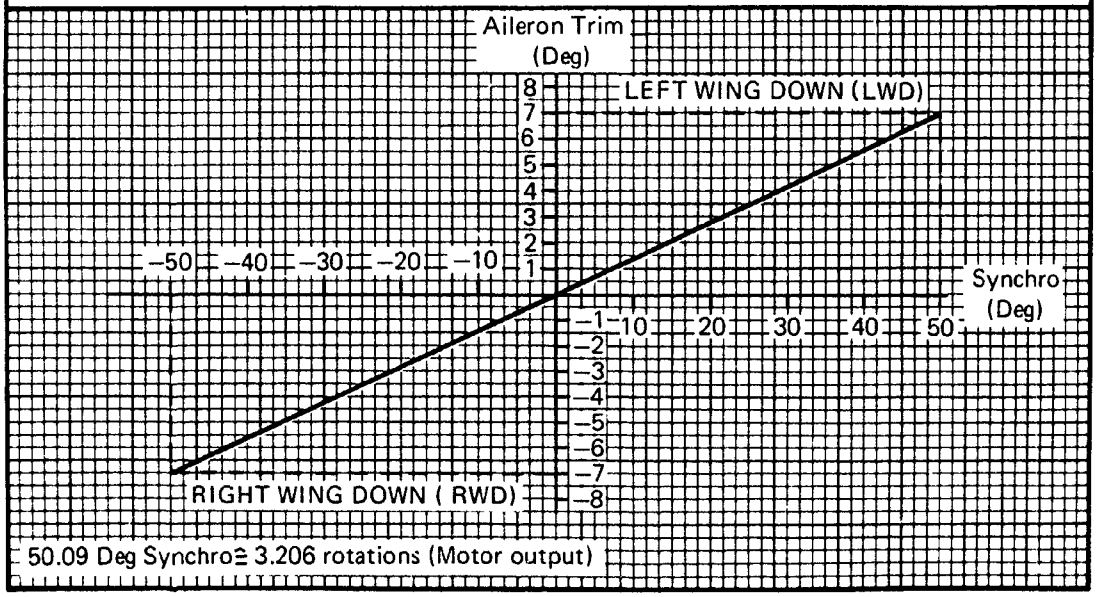
Diagram
Figure 031

Parameter No: 402 **Name:** AILERON TRIM

Signal Type: SYNCHRO

Aileron trim	Synchro	Synchro travel	AD Conversion count	DFDR Dig. value	DFDAU Dig. value - 429
7 Deg RWD	–50.09 Deg	+309.91 Deg		882	3526
0 Deg	0 Deg	0 Deg	zero count	0	0
7 Deg LWD	+50.09 Deg	+50.09 Deg		142	570
—	+360.0 Deg	+360.0 Deg	full count	1023	4095

Signal Characteristic:



BM6 31 32 00 0BBT0-12

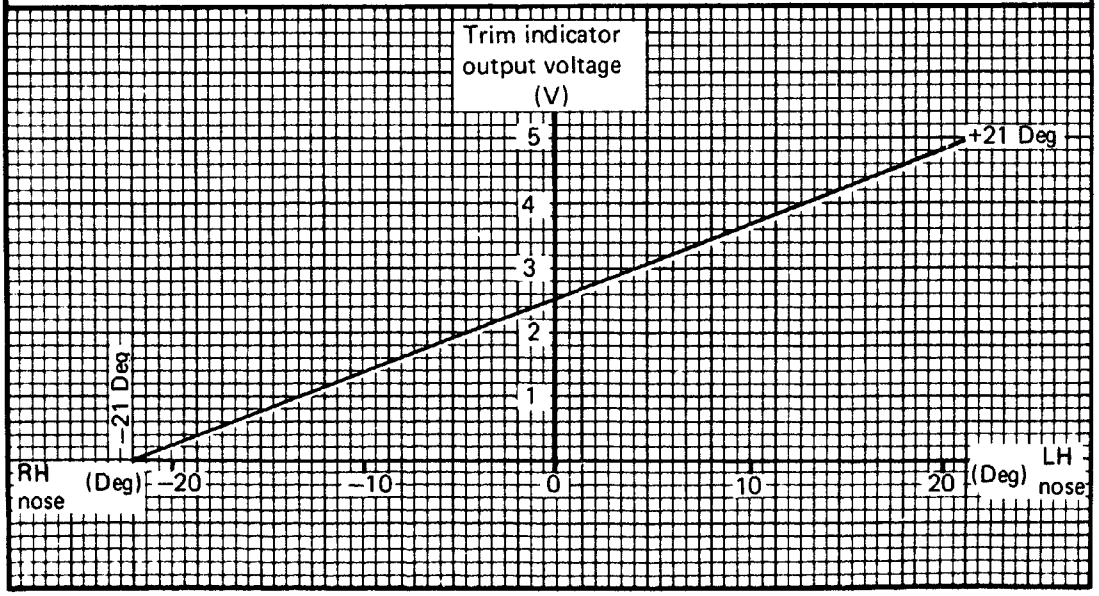
Diagram
Figure 032

Parameter No: 403 **Name:** RUDDER TRIM

Signal Type: LLDC 0-5V

Rudder Trim	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
21Deg $_{RH}$ (nose)	0V	zero count	0	0	
0 Deg	2.5V		511	2047	
21Deg $_{LH}$ (nose)	5.0V	full count	1023	4095	

Signal Characteristic:



BM6 31320 0BBU0-12

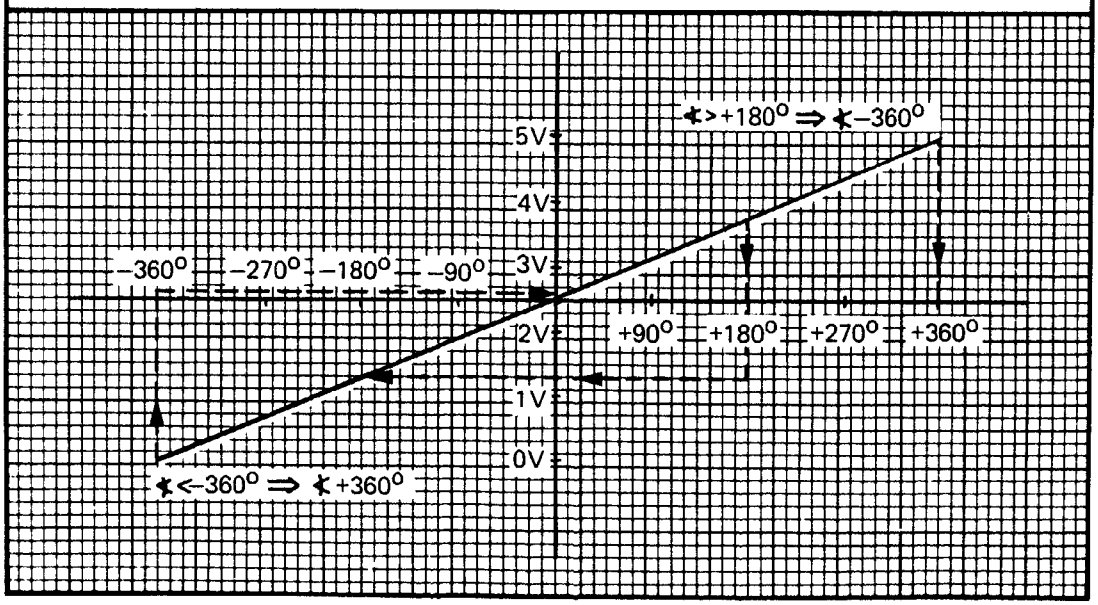
Diagram
Figure 033

Parameter No: 404 **Name:** N1 VIBRATION ANGLE ENG 1

Signal Type: LLDC 0-5V

Vibration phase angle	Input voltage	AD Conversion count	DFDAU-output Dig. value - 429		
–360 Deg	0V	zero count	0		
–180 Deg	1.25V		1023		
0 Deg	2.5V		2047		
+180 Deg	3.75V		3071		
+360 Deg	5V	full count	4095		

Signal Characteristic: Linear



M6 31 32 00 0 BB V 0-12

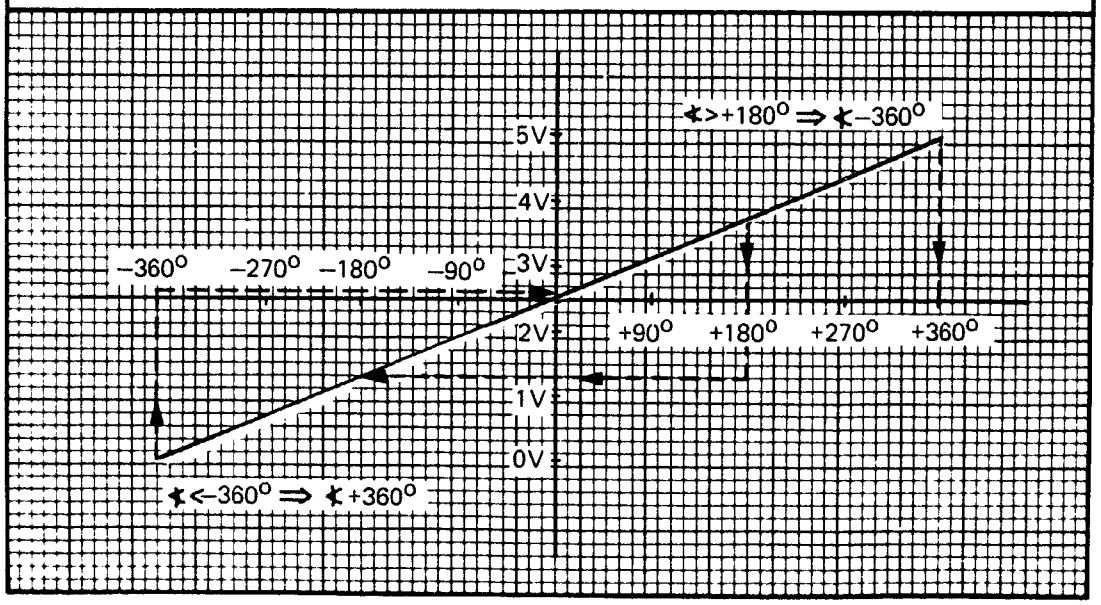
Diagram
Figure 034

Parameter No: 405 **Name:** N1 VIBRATION ANGLE ENG 2

Signal Type: LLDC 0-5V

Vibration phase angle	Input voltage	AD Conversion count	DFDAU-output Dig. value - 429		
–360 Deg	0V	zero count	0		
–180 Deg	1.25V		1023		
0 Deg	2.5V		2047		
+180 Deg	3.75V		3071		
+360 Deg	5V	full count	4095		

Signal Characteristic: Linear



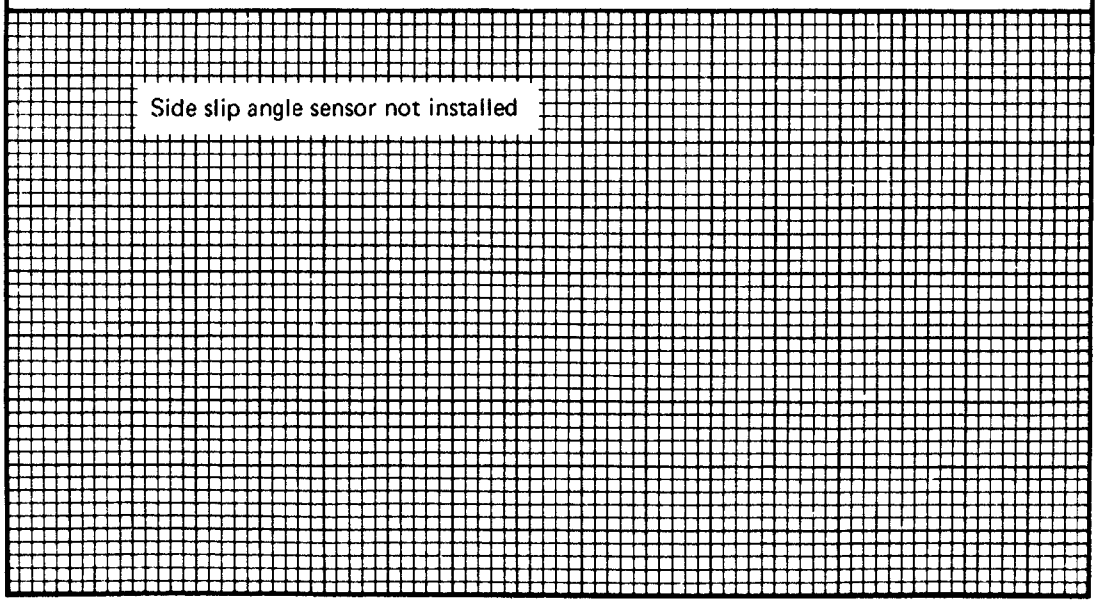
BM6 31 32 00 0BB W0-12

Diagram
Figure 035

Parameter No: 406 **Name:** SIDE SLIP ANGLE

Signal Type: POTENTIOMETER

Signal Characteristic:



BM6 31320 0 88 X 0-12

Diagram
Figure 036

AIDS INPUTS - DESCRIPTION AND OPERATION

1. General
   The parameter set sampled by the DFDAU and recorded on the DFDR contains the basic parameters. These include the mandatory parameters and an additional part to standardize the parameter list. An appended part of DFDAU parameters contains optional parameters requested by the airline.
   All received parameters are listed and described in the separate parameter list.

2. Description

   A. Architecture of Inputs
      The DFDAU is connected to various sensors and source systems to collect the basic, optional and expanded parameter sets. The block diagram of parameter sources shows the connection of the DFDAU to the respective sources. Details about the connection of the source systems are shown in the inputs interconnection diagrams.

**ON A/C 001-003,

(1)DFDAU Input Sources
The following systems are connected to the DFDAU:
(a)Automatic Flight System
- FCC1, FCC2 (301CA1, 301CA2)

(b)Communication System
- HF1, HF2 (1RE1, 1RE2)
- VHF1, VHF2, (1RC1, 1RC2)

(c)Flight Control System
- slats and flaps position instrumentation units (3CN, 4CN)
- pitch trim wheel synchro (41WW)

(d)Ice and Rain Protection System
- LH, RH, normal, alternate wing anti-ice valves (37DM, 38DM, 87DM, 88DM)
- inlet anti-ice valves eng.1, eng.2
- start valves eng.1, eng.2

(e)Independent Instruments System
- GMT clock copilot (2FS)
- SDAC (1WV)
- AIDS accelerometer (6TU) and identification plug (1884VC)
- FWC1 (1WW1)
- CGCC (1GU)

(f)Landing Gear System
- landing gear relays (58GB, 101GB, 117GB)
- proximity switches via annunciators (165GB, 167GB, 169GB)

(g)Navigation System
- ILS1 (1RT1)
- radio altimeter (1SA1)
- VOR1 (301RS1)
- FMC1 (1CK1)
- FNSG 1/3 switched (28FN1/28FN3 via 41FN)

(h)Engine Fuel and Control System
- fuel flow indicators (4QD, 5QD)
- PMC1 and PMC2 units
- FQI (15QT)

(j)Engine Indicating System (GE)
- N2 indicators eng.1, eng.2 (3EP, 4EP)
- EGT indicators eng.1, eng.2 (3EY, 4EY)

(k)Exhaust System
- reverser microswitches via the REV UNLK annunciators (9KM, 10KM)
- reverser microswitches via the REV annunciators (11KM, 12KM)

Details about the connection of the source systems are shown in the inputs interconnection diagrams.

**ON A/C 004-100,

(1)DFDAU Input Sources

The following systems are connected to the DFDAU:

(a)Automatic Flight System
- FCC1, FCC2 (301CA1, 301CA2)
- FCU1 (303CA)
- TCC1, TCC2 (301CJ1, 301CJ2) via 315CJ
- TCAS (1SG)

(b)Communication System
- HF1, HF2 (1RE1, 1RE2)
- VHF1, VHF2, VHF3, (1RC1, 1RC2, 1RC3)

(c)Flight Control System
- slats and flaps position instrumentation units (3CN, 4CN)
- speed brake lever (7CS)
- pitch trim wheel synchro (41WW)
- ground spoiler arm switch (41CS)

(d)Ice and Rain Protection System
- LH, RH, normal, alternate wing anti-ice valves (37DM, 38DM, 87DM, 88DM)
- inlet anti-ice valves eng.1, eng.2
- anti-ice switches eng. 1, eng. 2
- start valves eng.1, eng.2

(e)Independent Instruments System
- GMT clock copilot (2FS)
- SDAC (1WV)
- AIDS accelerometer (6TU) and identification plug (1884VC)
- FWC1 (1WW1)
- GPWS (1Wz)
- CGCC (1GU)
- ECAM CP (5WT)
- DU WARN (1WT)
- DU SYS (3WT)
- SGU 1 (9WT)
- AC Bus 1 warn relay (29XN)
- Bridge rectifier (23XN)

(f)Landing Gear System
- landing gear relays (58GB, 101GB, 117GB)

- proximity switches via annunciators (165GB, 167GB, 169GB)
- brake system control unit (29GG)
- landing gear control lever (2GA)

(g)Navigation System
- ILS1, ILS2 (1RT1, 1RT2)
- radio altimeter (1SA1)
- VOR1, VOR2 (301RS1, 301RS2)
- FMC1, FMC2 (1CK1, 1CK2)
- FNSG 1/3 switched (28FN1/28FN3 via 41FN) FNSG 2/3 via 34WW
- IRS 1/3 switched (301FP1/301FP3 via 76TU)
- ADC1 (1FL1)
- DME1, DME2 (1SD1, 1SD2)
- FNCP1, FNCP2 (42FN1, 42FN2)

(h)Engine Fuel and Control System
- fuel flow indicators (4QD, 5QD)
- EEC1 and EEC2 units (PMC1, PMC2)
- FQI (15QT)

(j)Engine indicating system
- PMUX1, PMUX2 units
- N2 indicators eng. 1, eng. 2 (3EP, 4EP)
- EGT indicators eng. 1, eng. 2 (3EY, 4EY)

(k)Exhaust System
- reverser microswitches via the REV UNLK annunciators (9KM, 10KM)
- reverser microswitches via the REV annunciators (11KM, 12KM)

Details about the connection of the source systems are shown in the inputs interconnection diagrams.

(l)Hydraulic System
- green, yellow, blue sensor (30WW, 31WW, 29WW)

**ON A/C 001-003,

(2)Power Supply of Input Sources
The DFDAU is connected to the 115 V AC essential busbar. From the DFDAU the Linear Accelerometer (LA) is supplied directly with 28 V DC.
All parameter source systems are supplied by their own system power supplies, with the exception of:
- the energization of both propulsion multiplexers (PMUX 1/2) from 28 V DC normal busbar 111PP via circuit breaker 12TU.
- the power supply of the pullup resistors (78TU, 79TU) for the reverser annunciators from 28 V DC essential busbar 306PP via circuit breaker 5RK.
- the power supply of the pullup resistors (80TU, 81TU) for the start valve switches from 28 V DC essential busbar 306PP via circuit breaker 5RK.

**ON A/C 004-100,

(2)Power Supply of Input Sources
The DFDAU is connected to the 115 V AC essential busbar. From DFDAU the LA is supplied directly with 28 V DC. The DMU is connected to the

115 V AC normal busbar.
All parameter source systems are supplied by their own system power supplies, with the exeptions of
- the energization of both propulsion multiplexers (PMUX 1/2) from 28 V DC normal busbar 111PP via circuit breaker 12TU,
- the power supply of the pullup resistor (72TU) for the landing gear control lever from 28 V DC normal busbar 111PP via circuit breaker 12TU,
- the power supply of the switching relay (76TU) for the IRS1/IRS3 switching from 28 V DC normal busbar 111PP via circuit breaker 12TU,
- the power supply of the pullup resistors (78TU, 79TU) for the reverser annunciators from 28 V DC essential busbar 306PP via circuit breaker 5RK,
- the power supply of the pullup resistors (80TU, 81TU) for the start valve switches from 28 V DC essential busbar 306PP via circuit breaker 5RK.

**ON A/C 001-100,

B. Parameters
The parameters processed in the DFDAU are listed in the parameter list. This description includes information about the source, input characteristics, input connector pin assignment and output characteristic of the parameters.
For parameters which need a more detailed description about linearity, signal levels or accuracy a separate detailed description of the parameters is described in a separate parameter description manual.
The DFDAU is capable of recognizing its location on different aircraft type by decoding the IDENT DISCRETES. The assignment of these 18 discretes is specified in Table 1. Each of these pins will be coded by either 'open' or connected to the identification common pin (AD11K). The connection to identification common will indicate the 'one' state.

Table 1 Identification Coding:

PIN CODING FOR CONNECTOR AD																	
A/C TYPE IDENT						FLEET IDENT			A/C No. IDENT							A/C No.	REGISTR
9F	9E	9D	9C	9B	9A	9K	9J	9H	9G	11H	11G	11F	11E	11D	11C	11B	11A		
0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	585/001	
0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	587/002	
0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	590/003	
0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	653/004	AP-BEG
0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	656/005	
0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	691/006	

**ON A/C 001-003,

(1)Parameter List
The parameter list contains all necessary data to describe the main characteristics of the parameters. The list for the DFDAU parameters includes:
- the parameter number
- the name of the parameter
- the source

with the input characteristics of:
- the signal type or the label, SDI and EQ
- the range
- the accuracy
- the sign bit, data bits, UPD/s and code
- the connector pin assignment

and the output characteristics of
- the location in the DFDR and QAR frame
- the ARINC 429 label, SDI, data MSB and LSB, UPD/s and code
- the CDU parameter coding.

(a)Parameter Number
The parameter numbers are consecutive numbers, which are identical to the numbers defined in the system specificaiton.
From number 1 to 99 the parameter set lists all mandatory parameters, from number 100 to 199 the additional basic part is listed. The parameters from number 200 to 499 are optional parameters.
Parameter numbers continue in grouped areas for the respective input source systems.

(b)Name of the Parameter
The name of the parameter is a short concise interpretation of the functional identification and is identical to the name defined in the system specification.

(c)Source
The source defines the sensor or source system from which the signal is transmitted.

(d)Signal Type or Label, SDI and EQ
The signal type of the parameters is listed, except the parameter transmitted via a serial ARINC 429 bus. In this case the label, SDI and equipment identification code (EQ) are listed for an explicit identification of the DITS parameters.
The SDI (or system number) together with the EQ determines also the input port of the data bus. This port number is used in the DFDAU software routines.

(e)Range
The listed values describe the operational range of the parameter. This is the range in which the parameter is normally working. For some ARINC 429 parameters the digital word range is listed. This is marked by a 'W' in front of the values. The word range is the range which can be transmitted in this data word. The values of the parameter must not necessarily use whole range.
For discrete bit information received via the ARINC 429 bus the respective bit position in the ARINC 429 word is mentioned.

(f)Accuracy
The listed accuracy is the overall accuracy including the conversion

error of the DFDAU acquisition part.

(g) Sign Bit, Data Bits, UPD/s and Code

These columns are only valid for data received via an ARINC 429 bus. The sign bit column shows the position of the sign bit in the received ARINC 429 word if the sign bit is used.
For the mentioned data bits the most significant bit (MSB) is defined as bit number 28 of the ARINC 429 word.
The listed update per second (UPD/s) is the average number of transmissions per second of this parameter to the DFDAU.
In the column code the type of coding of the received data is mentioned. If the ARINC 429 word is neither defined as BNR nor as BCD, the word is a discrete or special coded type.

(h) Input Connector Pin Assignment

The listed pin assignment identifies the insert and the pin in relation to the ARINC 717 Standards.
Table 2 shows the ARINC 717 Standards which define the connection method of the different types of inputs for the DFDAU. This standardization allows the use of a general type of input port for all analog signals and to define by software how to handle the respective input signal.

(j) DFDR Data Frame Location

To find the location of the parameter on the DFDR data frame the word, subframe and number of bits (bit position for discretes) is listed for each recorded parameter. The bit position for discretes is written in brackets.

(k) Output Label, SDI, Data MSB and LSB, UPD/s and Code

The parameters are sent out on an ARINC 429 output bus. The defined label, SDI and data bits for MSB and LSB, as well as update per second (UPD/s) on this bus are mentioned in the respective columns.

Table 2 Input Connector Pin Assignment Standards

Type of Input	Connector Pin			
	a	b	c	d
Synchro	X	Z	Y	OPEN
AC Voltage Ratio 1	H	C	R	OPEN
AC Voltage Ratio 2	H	C	R	OPEN
DC Voltage	H	C	OPEN	OPEN
DC Voltage Ratio	H	C	R	OPEN
Potentiometer	H	C	OPEN	OPEN
Resistance Probe	H	C	OPEN	EXC.
DITS PORT	A	B	OPEN	OPEN
Discrete	NO LEAD DESIGNATION			

The main parameter data are described in the following parameter list.
The list includes only:
- the parameter number
- the parameter name

with the input characteristics of
- the signal type or the label, SDI and EQ
- the sign bit, data bits and UPD/s

and the output characteristics of
- the CDU parameter coding.

Remarks used in the parameter list dependent on different parameters are described in front of the list.

**ON A/C 004-100,

(1)Parameter List
The parameter list contains all necessary data to describe the main characteristics of the parameters. The list for the DFDAMU/DFDAU parameters includes:
- the parameter number
- the name of the parameter

with the input characteristics of:
- the signal type or the label, SDI and EQ
- the range
- the accuracy
- the sign bit, data bits, UPD/s and code
- the connector pin assignment

and the output characteristics of
- the location in the DFDR and QAR frame
- the ARINC 429 label, SDI, data MSB and LSB, UPD/s and code

(a)Parameter Number
The numbers of the mandatory and the recommended parameters consists of 3 parts:
Part 1: ''M'' for mandatory parameters according to Eurocae ED55.
''R'' for recommended parameters according to Eurocae ED55.

Part 2: ''Serial No.'' according to Eurocae ED55.
Part 3: Continuous number
example: M (1) 1A (2) 01 (3) TIME GMT - HOURS

Remarks used in the parameter list dependent on different parameters are described in front of the list.
The numerical numbers in brackets < > are reference numbers defined in previous AIDS specification. The numbers of the optional parameters are numerical only.

(b) Name of the Parameter
The name of the parameter is a short concise interpretation of the functional identification and is identical to the name defined in the system specification.

(c) Signal Type or Label, SDI and EQ
The signal type of the parameters is listed, except the parameter transmitted via a serial ARINC 429 bus. In this case the label, SDI and equipment identification code (EQ) are listed for an explicit identification of the DITS parameters.
The SDI (or system number) together with the EQ also determines the input port of the data bus. This port number is used in the DFDAMU/DFDAU software routines.

(d) Range
The listed values describe the operational range of the parameter. This is the range in which the parameter is normally working. For some ARINC 429 parameters the digital word range is listed. This is marked by a 'W' in front of the values. The word range is the range which can be transmitted in this data word. The values of the parameter must not necessarily use the whole range.
For discrete bit information received via the ARINC 429 bus the respective bit position in the ARINC 429 word is mentioned.

(e)Accuracy
The listed accuracy is the overall accuracy including the conversion error of the **DFDAMU** acquisition part.
For some **ARINC 429** parameters the resolution is listed. This is marked by a **'R'** in front of the values.

(f)Sign Bit, Data Bits, UPD/s and Code
These columns are only valid for data received via the **ARINC 429** bus.
The sign bit column shows the position of the sign bit in the received **ARINC 429** word if the sign bit is used.
For the mentioned data bits the most significant bit **(MSB)** is defined as bit number 28 of the **ARINC 429** word.
The listed update per second **(UPS/s)** is the average number of transmissions per second of this parameter to the **DFDAMU/DFDAU.**
In the column code the type of coding of the received data is mentioned. If the **ARINC 429** word is neither defined as **BNR** nor as **BCD,** the word is a discrete or special coded type.

(g)Input Connector Pin Assignment
The listed pin assignment identifies the insert and the pin in relation to the **ARINC 717** Standards.
Table 2 shows the **ARINC 717** Standards which define the method of the connection of the different sort of inputs for the **DFDAMU/DFDAU.** This standardization allows the use of a general type of input port for all analog signals and to define by software how to handle the respective input signal.

(h)**DFDR** Data Frame Location
To find the location of the parameter on the **DFDR** data frame the word, subframe and number of bits (bit position for discretes) is listed for each recorded parameter. The bit position for discretes is written in brackets.

(j)Output Label, **SDI,** Data **MSB** and **LSB, UPD/s** and Code
The parameters are sent out on an **ARINC 429** output bus. The defined label, **SDI** and data bits for **MSB** and **LSB,** as well as update per second **(UPD/s)** on this bus are mentioned in the respective columns.

Table 2 Input Connector Pin Assignment Standards

Type of Input	Connector Pin			
	a	b	c	d
Synchro	X	Z	Y	OPEN
AC Voltage Ratio 1	H	C	R	OPEN
AC Voltage Ratio 2	H	C	R	OPEN
DC Voltage	H	C	OPEN	OPEN
DC Voltage Ratio	H	C	R	OPEN
Potentiometer	H	C	OPEN	OPEN
Resistance Probe	H	C	OPEN	EXC.
DITS PORT	A	B	OPEN	OPEN
Discrete	NO LEAD DESIGNATION			

R **ON A/C 001-100,

DFDAU PARAMETER LIST (PART 1)	
Parameter Number	Type
001	Mandatory Parameters
|	|
|	|
045	
046	Spare
|	|
|	|
099	
100	Basic Parameters
|	|
|	|
166	
167	Spare
|	|
|	|
199	
200	Optional Parameters
|	|
|	|
499	

Following remarks are used in the DFDAU parameter list part 1 for:
mandatory parameters
- (1) if installed
- (4) SDI will be 1,1 in switched position

- (9) SDI is equal to SDI of used IRS
basic parameters
- (2) In A310-300 only
- (4) SDI will be 1,1 in switched position
- (8) if available from FMC
optional parameters
- not applicable

**ON A/C 004-100,

Following remarks are used in the DFDAU parameter list for:
mandatory parameters
- (1)Recording of a '0' if VHF or HF keying are in send mode
- (2)Bit 24 to 14 of the ARINC 429 word
- (3)Bit 29, 27 to 24 of the ARINC 429 word
- (4)Accuracy at 10.000 ft. For further values see ADC specification
- (5)Parameter used engine General Electric
- (6)Parameter used engine Pratt & Whitney 7T9D-7R4
- (7)Parameter used for engine Pratt & Whitney 4000
- (8)Definition for A310-200 and A310-300
- (9)Definition for A300-600 and A300-600R
-(10)Recording of a '1' if one or more of these bits have state 1
recommended parameters
- (1)Parameter source is FMC1 if FCC1 or FMC2 if FCC2 is selected
- (2)Bit 20 to 10 of the ARINC word
- (3)Bit 29, 27 to 21 of the ARINC word
- (4)Bit 21 to 11 of the ARINC word
- (5)Bit 29 to 22 of the ARINC word
- (6)IRS Smith
- (7)IRS Honeywell
- (8)Parameter used for engine General Electric
- (9)Parameter used for engine Pratt & Whitney JT9D-7R4
-(10)Parameter used for engine Pratt & Whitney 4000
-(11)Significant data digits
-(12)Bit 22 to 15 of the ARINC word
-(13)Bit 29 to 23 of the ARINC word
-(14)Bit 17 to 11 of the ARINC word
-(15)Bit 22 to 15 of the ARINC word
-(16)Bit 28 to 21 of the ARINC word
-(17)Word range is 108.00 to 111.95 MHz because the most significant
digit is added by the receiver
optional parameters
-(1)for A310-300 and A300-600R only
-(2)Parameter used for engine Pratt & Whitney JT9D-7R4
-(3)Definition for A310-200 and A310-300
-(4)Parameter used for General Electric
-(9)peak to peak

**ON A/C 001-003,

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
34	1	ALTITUDE (1013 mb) FINE	203 01 25 (4)		12	5
34	2	ALTITUDE (1013 mb) COARSE	203 01 25 (4)	29	11	5
34	3	INDICATED ANGLE OF ATTACK	221 01 25 (4)	29	12	5
34	4	COMPUTED AIRSPEED	206 01 25 (4)		14	5
34	5	RADIO HEIGHT	164 01 07	29	16	25
34	6	MAGNETIC HEADING	320 01 25 (4)	29	10	10
34	7	PITCH ANGLE	324 01 25 (9)	29	10	20
34	8	ROLL ANGLE	325 01 25 (9)	29	10	20
31	9	BODY NORMAL ACCELERATION	LLDC 0-5V			
31	10	BODY LATERAL ACCELERATION	LLDC 0-5V			
31	11	BODY LONGITUDINAL ACCELER.	LLDC 0-5V			
34	12	GLIDE SLOPE DEVIATION	174 01 10	29	12	16

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
1	W 4096 ft (1) 0 to 4000 ft	R 1 ft +/- 20 ft (5)	05	1234	12	
2	W +/- 131 072 ft (2) -2000 to +51 000 ft	R 64 ft +/- 80 ft (5)	23	1000	12	
3	W +/- 180 Deg -35 to +85 Deg	R 0.0439 Deg +/- 0.49 Deg	11 43	1234 1234	10 10	
4	W 1024 Kts 30 to 450 Kts	R 0.0625 Kts +/- 5 Kts (5)	19	1234	12	
5	W +/- 8192 ft -20 to +2500 ft	R 0.125 ft +/- 1.8 ft (6)	44	1234	12	
6	W +/- 180 Deg +/- 180 Deg	R 0.175 Deg +/- 3.01 Deg	03	1234	10	
7	W +/- 180 Deg +/- 90 Deg	R 0.175 Deg +/- 0.13 Deg	51	1234	10	
8	W +/- 180 Deg +/- 180 Deg	R 0.175 Deg +/- 0.2 Deg	17	1234	10	
9	- 3 g to + 6 g	+/- 0.047 g	13 29 45 61 04 20 36 52	1234 1234 1234 1234 1234 1234 1234 1234	10 10 10 10 10 10 10 10	
10	+/- 1 g	+/- 0.01 g	15 31 47 63	1234 1234 1234 1234	10 10 10 10	
11	+/- 1 g	+/- 0.01 g	02 18 34 50	1234 1234 1234 1234	12 12 12 12	
12	W +/- 0.8 DDM +/- 0.8 DDM	R 0.00019 DDM +/- 0.012 DDM	26	1234	10	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
34	13	LOCALIZER DEVIATION	173 01 10	29	12	16
31	14	GMT	125 00 31		19	7.5
27	15	STABILIZER POSITION	315 00 29	29	11	8
27	16	ELEVATOR POSITION	314 00 29	29	11	8
27	17	RUDDER POSITION	312 00 29	29	11	8
27	18	ALL SPEED AILERON LH	310 01 29	29	11	8
27	19	ALL SPEED AILERON RH	310 10 29	29	11	8
27	20	FLAPS POSITION	Synchro			
27	21	SLATS POSITION	Synchro			
27	22	SLATS FAULT	126 01 26		#11	5
27	23	FLAPS FAULT	126 01 26		#12	5
78	24	REVERSER UNLOCK ENG 1	28V/0V-Sh			
78	25	REVERSER IN POSITION ENG 1	28V/0V			
78	26	REVERSER UNLOCK ENG 2	28V/0V-Sh			
78	27	REVERSER IN POSITION ENG 2	28V/0V			
	28	Spare				
	29	Spare				
77	30	N1 ACTUAL ENG 1 (3)	346 01 1A		12	24
77	31	N1 ACTUAL ENG 2 (3)	346 10 1A		12	24

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
13	W +/- 0.4 DDM	R 0.00009 DDM	10	1234	12	
	+/- 0.4 DDM	+/- 0.0047 DDM				
14	0 to 23h59'.9'	0.1'	37	1030	12	
15	W +/- 180 Deg	R 0.0879 Deg	55	1030	10	
	+ 14 to - 2 Deg	+/- 0.92 Deg				
16	W +/- 180 Deg	R 0.0879 Deg	41	1234	10	
	+ 30 to - 15 Deg	+/- 0.92 Deg				
17	W +/- 180 Deg	R 0.0879 Deg	27	1234	10	
	+/- 30 Deg	+/- 0.91 Deg	59	1234	10	
18	W +/- 180 Deg	R 0.0879 Deg	09	1234	10	
	+/- 23 Deg	+/- 0.92 Deg				
19	W +/- 180 Deg	R 0.0879 Deg	40	1234	10	
	+/- 23 Deg	+/- 0.92 Deg				
20	0 to 41 Deg	+/- 1 Deg	39	1030	10	
		0 to 33.5 Deg (2)				
21	0 to 25 Deg	+/- 1 Deg	39	0204	10	
22	bit status 1		17	1234	(1)	
23	bit status 1		17	1234	(2)	
24	bit status 0 (OV)		52	1234	(1)	
25	bit status 0 (OV)		07	1000	(1)	
26	bit status 0 (OV)		52	1234	(2)	
27	bit status 0 (OV)		07	0200	(1)	
28						
29						
30	W 256 % rpm	R 0.0625 %rpm	60	1000	12	
	15 to 125 % rpm	+/- 0.2 %rpm				
31	W 256 % rpm	R 0.0625 %rpm	60	0200	12	
	15 to 125 % rpm	+/- 0.2 %rpm				

ATA	NO	DFDAU PARAMETER LIST (PART 1) PARAMETER		INPUT CHARACTERISTICS SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
22	32	A/P CMD #1		146 -- 01		#12	20
22	33	A/P CWS #1		146 -- 01		#11	20
22	34	LAND TRACK #1		146 -- 01		#14	20
22	35	A/P CMD #2		146 -- 01		#12	20
22	36	A/P CWS #2		146 -- 01		#11	20
22	37	LAND TRACK #2		146 -- 01		#14	20
23	38	VHF 1		OPEN/OV-S			
23	39	VHF 2		OPEN/OV-S			
34	40	OUTER MARKER		222 01 11		#11	16
34	41	MIDDLE MARKER		222 01 11		#12	16
34	42	INNER MARKER		222 01 11		#13	16
23	43	VHF 3	(7)	OPEN/OV-S			
23	44	HF 1		OPEN/OV-S			
23	45	HF 2	(7)	OPEN/OV-S			
	46 to 99	Spare					
34	100	MACH		205 01 25 (4)		13	5
34	101	TAT		211 01 25 (4)	29	11	5
34	102	MAX. ALLOWABLE AIRSPEED		207 01 25 (4)		12	5
34	103	VMO / MMO		126 01 26		#22	5
31	104	EVENT		OPEN/OV-S			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
32	bit status 1		31	1234	(2)	
33	bit status 1		31	1234	(1)	
34	bit status 1		29	1234	(1)	
35	bit status 1		51	1234	(2)	
36	bit status 1		51	1234	(1)	
37	bit status 1		29	1234	(2)	
38	bit status 0 in send mode		09	1234	(1)	
39	bit status 0 in send mode		09	1234	(2)	
40	bit status 1 (400Hz)		03	1234	(1)	
41	bit status 1 (1300Hz)		03	1234	(2)	
42	bit status 1 (3000Hz)		26	1234	(2)	
43	bit status 0 in send mode		26	1234	(1)	
44	bit status 0 in send mode		47	1234	(1)	
45	bit status 0 in send mode		47	1234	(2)	
46 to 99						
100	W 4.096 M 0.1 to 1.00 M	R 0.0005 M +/- 0.004 M (5)	21	1030	12	
101	W +/- 512 Deg C - 60 to + 99 Deg C	R 0.250 Deg C +/- 1.13 Deg C	55	0204	10	
102	W 1024 Kts 150 to 450 Kts	R 0.25 Kts +/- 1 Kts	21	0204	12	
103	bit status 1		04	0204	(2)	
104	bit status 1 Button depressed		13	1234	(1)	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
31	105	DOC. DATA - DATE	260 00 31		11	7.5
31	106	DOC. DATA - FLIGHT NO	261 01 02		16	1
	107	DOC. DATA - Flight Leg (1)				
31	108	A/C TYPE	OPEN/OV			
31	109	A/C TAIL NUMBER	OPEN/OV			
31	110	FLEET IDENTIFICATION	OPEN/OV			
31	111	BITE				
77	112	EVM FAN ENG 1 (N1)	135 01 29		8	4
77	113	EVM FAN ENG 2 (N1)	135 10 29		8	4
77	114	EVM TURBINE ENG 1 (N2)	136 01 29		8	4
77	115	EVM TURBINE ENG 2 (N2)	136 10 29		8	4
27	116	SPOILER 1 LH RET	146 00 29		#11	4
27	117	SPOILER 2 LH RET	146 00 29		#13	4
27	118	SPOILER 3 LH RET	146 00 29		#15	4
27	119	SPOILER 4 LH RET	146 00 29		#17	4
27	120	SPOILER 5 LH RET	146 00 29		#19	4
27	121	SPOILER 6 LH RET	146 00 29		#21	4
27	122	SPOILER 7 LH RET	146 00 29		#23	4
27	123	SPOILER 1 RH RET	146 00 29		#12	4
27	124	SPOILER 2 RH RET	146 00 29		#14	4
27	125	SPOILER 3 RH RET	146 00 29		#16	4

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
105	0 to 31 Days 0 to 12 Months	1 Day 1 Month	23	0200	12	
106	0 to 9999	1	23	0200	12	
107	0 to 9					
108	: For bit		23	0200	12	
	:					
109	> status		23	0200	12	
	:					
110	: see Table 3		23	0200	12	
111	12 Bit		37	0200	12	
112	W 12.8 units 0 to 10.0 units	R 0.05 units +/- 0.59 units	16	1030	10	
113	W 12.8 units 0 to 10 units	R 0.05 units +/- 0.59 units	28	1030	10	
114	W 12.8 units 0 to 10.0 units	R 0.05 units +/- 0.59 units	16	0204	10	
115	W 12.8 units 0 to 10.0 units	R 0.05 units +/- 0.59 units	28	0204	10	
116	bit status 1		16	1234	(1)	
117	bit status 1		20	1234	(1)	
118	bit status 1		28	1234	(1)	
119	bit status 1		36	1234	(1)	
120	bit status 1		40	1234	(1)	
121	bit status 1		43	1234	(1)	
122	bit status 1		59	1234	(1)	
123	bit status 1		16	1234	(2)	
124	bit status 1		20	1234	(2)	
125	bit status 1		28	1234	(2)	

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
27	126	SPOILER 4 RH RET	146 00 29		#18	4
27	127	SPOILER 5 RH RET	146 00 29		#20	4
27	128	SPOILER 6 RH RET	146 00 29		#22	4
27	129	SPOILER 7 RH RET	146 00 29		#24	4
36	130	X FEED VALVE CLOSED	145 00 29		#24	4
36	131	APU BLEED V. NOT FULLY OPEN	145 00 29		#15	4
36	132	BLEED VALVE ENG 1 OPEN	145 00 29		#12	4
36	133	BLEED VALVE ENG 2 OPEN	145 00 29		#11	4
79	134	OIL QUANTITY ENG 1	073 01 29		11	8
79	135	OIL QUANTITY ENG 2	073 10 29		11	8
21	136	PACK MAN MODE SELECT 1	145 00 29		#26	4
21	137	PACK MAN MODE SELECT 2	145 00 29		#25	4
30	138	INLET AI VALVE ENG 1 OPEN	OPEN/OV-S			
30	139	INLET AI VALVE ENG 2 OPEN	OPEN/OV-S			
30	140	WING AI VALVE LH NORM UNCL	OPEN/OV-S			
30	141	WING AI VALVE RH NORM UNCL	OPEN/OV-S			
80	142	START VALVE POS ENG 1 CLSD	28V/OV			
80	143	START VALVE POS ENG 2 CLSD	28V/OV			
32	144	LDG DOWN AND LOCKED LH	28V/OV-Sh			
32	145	LDG DOWN AND LOCKED RH	28V/OV-Sh			
32	146	LDG DOWN AND LOCKED NOSE	28V/OV-Sh			
32	147	LDG SQUAT SWITCH LH	OPEN/OV-S			
32	148	LDG SQUAT SWITCH RH	OPEN/OV-S			
32	149	LDG SQUAT SWITCH NOSE	OPEN/OV-S			
76	150	TLA ENG 1 (3)	133 01 1A		12	8

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
126	bit status 1		36	1234	(2)	
127	bit status 1		40	1234	(2)	
128	bit status 1		43	1234	(2)	
129	bit status 1		59	1234	(2)	
130	bit status 1		57	0200	(1)	
131	bit status 1		57	0030	(1)	
132	bit status 1		07	0030	(2)	
133	bit status 1		07	0004	(2)	
134	W 102.4 quart US 0 to 20 quart US	R 0.05 qrt US +/- 0.55 qt US	42	1000	10	
135	W 102.4 quart US 0 to 20 quart US	R 0.05 qrt US +/- 0.55 qt US	42	0030	10	
136	bit status 1		57	0030	(2)	
137	bit status 1		57	1000	(2)	
138	bit status 1		39	1030	(1)	
139	bit status 1		39	1030	(2)	
140	bit status 1		57	0004	(1)	
141	bit status 1		57	0004	(2)	
142	bit status 1		08	1234	(1)	
143	bit status 1		08	1234	(2)	
144	bit status 0		04	1030	(2)	
145	bit status 0		04	1030	(1)	
146	bit status 0		04	0204	(1)	
147	bit status 1 on ground		13	1234	(2)	
148	bit status 1 on ground		15	1234	(1)	
149	bit status 1 on ground		15	1234	(2)	
150	W 512 Deg 15 to 87.5 Deg	R 0.125 Deg +/- 0.51 Deg	12	1000	12	

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
76	151	TLA ENG 2 (3)	133 10 1A		12	8
77	152	N2 ENG 1 (3)	LLDC 0-5V			
77	153	N2 ENG 2 (3)	LLDC 0-5V			
78	154	EGT ENG 1 (3)	LLDC 0-5V			
77	155	EGT ENG 2 (3)	LLDC 0-5V			
73	156	FUEL FLOW ENG 1	LLDC 0-5V			
73	157	FUEL FLOW ENG 2	LLDC 0-5V			
30	158	WING AI VALVE LH ALT UNCL	OPEN/OV			
30	159	WING AI VALVE RH ALT UNCL	OPEN/OV			
27	160	SPOILER 1+4 FAULT/OFF	126 01 26		#13	5
27	161	SPOILER 3+2 FAULT/OFF	126 01 26		#14	5
27	162	SPOILER 5 FAULT/OFF	126 01 26		#15	5
27	163	SPOILER 6 FAULT/OFF	126 01 26		#16	5
27	164	SPOILER 7 FAULT/OFF	126 01 26		#17	5
31	165	DFDAU PROGRAM IDENT				
34	166	DATA BASE UPDATE (9)	263 01 02		12	1
31	167	CENTER OF GRAVITY	076 00 3E		14	5
27	168	AFT CG WARNING	126 01 26		#18	5
27	169	PITCH TRIM WHEEL SYNC	SYNCHRO			
28	170	TRIM TANK QUANTITY	263 00 2C		15	1
28	171	AUX TANK 1 QUANTITY (1)	264 00 2C		15	1
28	172	AUX TANK 2 QUANTITY (1)	265 00 2C		15	1
	173 to 266	Spare				

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
151	W 512 Deg	R 0.125 Deg	12	0200	12	
	15 to 87.5 Deg	+/- 0.5 Deg				
152	0 to 120 % rpm	+/- 0.5 % rpm	33	1000	12	
153	0 to 120 % rpm	+/- 0.5 % rpm	33	0200	12	
154	0 to 1000 Deg C	+/- 4.57 Deg C	53	1000	12	
155	0 to 1000 Deg C	+/- 4.57 Deg C	53	0200	12	
156	0 to 12 500 Kg/h	+/- 139.3 Kg/h	35	1000	10	
157	0 to 12 500 Kg/h	+/- 139.3 Kg/h	35	0030	10	
158	bit status 1		39	0004	(1)	
159	bit status 1		39	0004	(2)	
160	bit status 1		11	1234	(2)	
161	bit status 1		35	1234	(2)	
162	bit status 1		35	1234	(1)	
163	bit status 1		42	1234	(2)	
164	bit status 1		42	1234	(1)	
165	8 BIT		23	0200	12	
166	DAY,MONTH,CYCLE		54	0004	12	
167	W 163.84 % MAC	R 0.01 % MAC(2)	06	1234	12	
168	bit status 1		55	1234	(2)	
169	+ 61.9 to - 289 Deg	0.243 Deg	38	0204	10	
170	W 131 072 lbs	R 4.0 lbs	54	1000	12	
	11 700 lbs	+/- 635 lbs (6)				
171	W 131 072 lbs	R 4.0 lbs	54	0200	12	
	12 700 lbs	+/- 585 lbs (6)				
172	W 131 072 lbs	R 4.0 lbs	54	0030	12	
173 to 266	12 700 lbs	+/- 585 lbs (6)				

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
32	267	SPARE ON/OFF	28V/0V			
27	268	SPARE				
27	269	SPARE				

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
267 268 269	bit status 1 (28 V)		64	1234	(1)	

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
32	270	SPARE ON/OFF	28V/0V			
34	271	SPARE				
31	272	SPARE ON/OFF	28V/0V			
34	273 to 283	SPARE				
32	284	SPARE LLDC	LLDC 0-5V			
32	285	SPARE LLDC	LLDC 0-5V			
27	286	SPARE ON/OFF	28V/0V			
27	287	SPARE POT	Pot			
34	288	SPARE				
76	289	SPARE ON/OFF	28V/0V			
76	290	SPARE ON/OFF	28V/0V			
	291 to 292	SPARE				

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
270	bit status 1 (28 V)		61	1234	(1)	
271						
272	bit status 1 (28 V)					
273 to 281						
282			23	0004	12	
283						
284			42	0200	10	
285			42	0004	10	
286	bit status 1 (28 V)		07	0030	(1)	
287			07	1000	10	
288						
289	bit status 1 (28 V)					
290	bit status 1 (28 V)					

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL (NO.SDI EQ)>	SIGN BIT	DATA BITS	UPD/ SEC
31	293	Discrete Word	370 00 3E		19	5
31	294	Maintenance Word	350 00 3E		19	5
31	295	Maintenance Word	350 00 3E		19	5
	296 to 388	Spare				

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
291						
292						
293						
to						
388						

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
	389	DFDR PLAYBACK DEFINITION	28V/0V			
	390	SPARE				
	391	SPARE				
	392	SPARE				
	393	SPARE				
	394	SPARE				
	395	SPARE				
	396	SPARE				
	397	SPARE				
	398	SPARE				
	399	SPARE				
	400	Spare				
	401	Spare				
27	402	SPARE SYNCHRO	Synchro			
27	403	SPARE LLDC	LLDC 0-5V			
77	404	SPARE LLDC	LLDC 0-5V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
389						
390						
391						
392						
393						
394						
395						
396						
397						
398						
399						
400						
401						
402			08	0204	10	
403			08	0030	10	
404						

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
77	405	SPARE LLDC	LLDC 0-5V			
34	406	SPARE POT	POT			1
	407 to 464	SPARE				
32	465	SPARE LLDC	LLDC 0-5V			
	466 to 499	SPARE				

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	ACCURACY	WORD	SUB FRAME	BITS	PARAMETER CODING
405						
406			12	0004	12	
407 to 464						
465 to 499						

**ON A/C 004-100,

DFDAU PARAMETER LIST (PART 1)

			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
31	M01A01 <98>	TIME GMT - HOURS ô >	150 00 31		17	7.5
31	M01A02 <99>	TIME GMT - MIN,SEC /				
31	M01B01 <282>	FRAME COUNTER				
34	M02.01 <1>	ALT (1013 mb) FINE ô (2) >	203 XX 25	29	17	5
34	M02.02 <2>	ALT (1013 mb) COARSE / (3)				
34	M03.01 <4>	COMPUTED AIRSPEED	206 XX 25		14	5
34	M04.01 <6>	MAGNETIC HEADING	320 XX 25	29	10	10
31	M05.01 <9>	BODY NORMAL ACCEL	LLDC 0-5V			

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M01A01 <98>	0 to 23h59'59"	1.0"	41	0004	5	
M01A02 <99>			50	0030	12	
M01B01 <282>	4096		56	0004	12	
M02.01 <1>	W +/- 131 072 ft	R 1 ft	58	1234	11	
M02.02 <2>	-2000 to +51 000 ft	+/- 20 ft (4)	57	0004	5	
M03.01 <4>	W 1024 Kts 30 to 450 Kts	R 0.0625 Kts +/- 5 Kts	10	1234	9	
M04.01 <6>	W +/- 180 Deg +/- 180 Deg	R 0.175 Deg +/- 3 Deg	09	1234	10	
M05.01 <9>	- 3 g to + 6 g	+/- 0.04 g	04 12 20 28 36 44 52 60	1234 1234 1234 1234 1234 1234 1234 1234	12 12 12 12 12 12 12 12	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL (OCT) > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
34	M06.01 <7>	PITCH ANGLE	324 XX 25	29	10	20
34	M07.01 <8>	ROLL ANGLE	325 XX 25	29	10	20
23	M08.01 <38>	VHF 1	OPEN/OV-Sh			
23	M08.02 <39>	VHF 2	OPEN/OV-Sh			
23	M08.03 <43>	VHF 3	OPEN/OV-Sh			
23	M08.04 <44>	HF 1	OPEN/OV-Sh			
23	M08.05 <45>	HF 2	OPEN/OV-Sh			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M06.01 <7>	W +/- 180 Deg +/- 90 Deg	R 0.175 Deg +/- 0.2 Deg	13 29 45 61	1234 1234 1234 1234	9 9 9 9	
M07.01 <8>	W +/- 180 Deg +/- 180 Deg	R 0.175 Deg +/- 0.2 Deg	14 46	1234 1234	10 10	
M08.01 <38>	bit status 0 in send mode (1)		09	1234	(1)	
M08.02 <39>	bit status 0 in send mode (1)		09	1234	(1)	
M08.03 <43>	bit status 0 in send mode (1)		09	1234	(1)	
M08.04 <44>	bit status 0 in send mode (1)		09	1234	(2)	
M08.05 <45>	bit status 0 in send mode (1)		09	1234	(2)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	M09A01 <30>	N1 ACTUAL ENG 1 (5)	346 01 1A		12	8
77	M09A02 <31>	N1 ACTUAL ENG 2 (5)	346 10 1A		12	8
76	M09B01 <150>	TRUST LEV ANGLE ENG 1 (5)	133 01 1A		12	4
76	M09B02 <151>	TRUST LEV ANGLE ENG 2 (5)	133 10 1A		12	4

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M09A01 <30>	W 256 % rpm 15 to 125 % rpm	R 0.0625 % rpm +/-0.25 % rpm	8	1234	9	
M09A02 <31>	W 256 % rpm 15 to 125 % rpm	R 0.0625 % rpm +/-0.25 % rpm	40	1234	9	
M09B01 <150>	W +/- 512 Deg 15 to 87.5 Deg	R 0.125 Deg +/- 0.5 Deg	16	1234	6	
M09B02 <151>	W +/- 512 Deg 15 to 87.5 Deg	R 0.125 Deg +/- 0.5 Deg	16	1234	6	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	M09A01 <30>	EPR ACTUAL ENG 1 (6)	340 10 1A		12	10
77	M09A02 <31>	EPR ACTUAL ENG 2 (6)	340 01 1A		12	10
76	M09B01 <150>	POWER LEVER ANGLE ENG 1 (6)	133 10 1A	29	12	10
76	M09B02 <151>	POWER LEVER ANGLE ENG 2 (6)	133 01 1A	29	12	10

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M09A01 <30>	W 4.00 0.5 to 1.97	R 0.000977 +/- 0.0049	8	1234	9	
M09A02 <31>	W 4.00 0.5 to 1.97	R 0.000977 +/- 0.0049	40	1234	9	
M09B01 <150>	W +/- 180 Deg - 8.9 to 135.81 Deg	R 0.044 Deg +/- 0.2 Deg	16	1234	6	
M09B02 <151>	W +/- 180 Deg - 8.9 to 135.81 Deg	R 0.044 Deg +/- 0.2 Deg	16	1234	6	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	M09A01 <30>	EPR ACTUAL ENG 1 (7)	340 00 1A		13	20
77	M09A02 <31>	EPR ACTUAL ENG 2 (7)	340 00 1A		13	20
76	M09B01 <150>	THROTTLE RESOLVER ANGLE (7) (TRA) ENG 1	133 00 1A		12	5
76	M09B02 <151>	THROTTLE RESOLVER ANGLE (7) (TRA) ENG 2	133 00 1A		12	5

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M09A01 <30>	W 4.00 0.5 to 2.20	R 0.0005 +/- 0.0045	8	1234	9	
M09A02 <31>	W 4.00 0.5 to 2.20	R 0.0005 +/- 0.0045	40	1234	9	
M09B01 <150>	W +/- 180 Deg 0 to 90 Deg	R 0.044 Deg +/-0.167 Deg	16	1234	6	
M09B02 <151>	W +/- 180 Deg 0 to 90 Deg	R 0.044 Deg +/-0.167 Deg	16	1234	6	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
27	M10.01 <20>	FLAPS POSITION	SYNCHRO			
27	M11.01 <21>	SLATS POSITION	SYNCHRO			
78	M12.01 <25>	REVERSER IN POS ENG 1	28V/0V			
78	M12.02 <27>	REVERSER IN POS ENG 2	28V/0V			
78	M12.03 <24>	REVERSER UNLOCK ENG 1	OPEN/0V-Sh			
78	M12.04 <26>	REVERSER UNLOCK ENG 2	OPEN/0V-Sh			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
	0 to 41 Deg (8)					
M10.01 <20>	0 to 33.5 Deg (9)	+/- 1 Deg	19	0204	8	
M11.01 <21>	0 to 25 Deg	+/- 1 Deg	17	1234	8	
M12.01 <25>	bit status 0 (OV)		21	1234	(2)	
M12.02 <27>	bit status 0 (OV)		22	1234	(2)	
M12.03 <24>	bit status 0 (OV)		21	1234	(1)	
M12.04 <26>	bit status 0 (OV)		22	1234	(1)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
		DFDAU PARAMETER LIST (PART 1)				
27	M13.01 <116>	SPOILER 1 LH RET	146 00 29		#11	4
27	M13.02 <117>	SPOILER 2 LH RET	146 00 29		#13	4
27	M13.03 <118>	SPOILER 3 LH RET	146 00 29		#15	4
27	M13.04 <119>	SPOILER 4 LH RET	146 00 29		#17	4
27	M13.05 <120>	SPOILER 5 LH RET	146 00 29		#19	4
27	M13.06 <121>	SPOILER 6 LH RET	146 00 29		#21	4
27	M13.07 <122>	SPOILER 7 LH RET	146 00 29		#23	4
27	M13.08 <123>	SPOILER 1 RH RET	146 00 29		#12	4
27	M13.09 <124>	SPOILER 2 RH RET	146 00 29		#14	4
27	M13.10 <125>	SPOILER 3 RH RET	146 00 29		#16	4
27	M13.11 <126>	SPOILER 4 RH RET	146 00 29		#18	4
27	M13.12 <127>	SPOILER 5 RH RET	146 00 29		#20	4
27	M13.13 <128>	SPOILER 6 RH RET	146 00 29		#22	4
27	M13.14 <129>	SPOILER 7 RH RET	146 00 29		#24	4

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M13.01 <116>	bit status 1		29	1234	(1)	
M13.02 <117>	bit status 1		29	1234	(2)	
M13.03 <118>	bit status 1		29	1234	(3)	
M13.04 <119>	bit status 1		10	1234	(1)	
M13.05 <120>	bit status 1		10	1234	(2)	
M13.06 <121>	bit status 1		10	1234	(3)	
M13.07 <122>	bit status 1		8	1234	(1)	
M13.08 <123>	bit status 1		8	1234	(2)	
M13.09 <124>	bit status 1		8	1234	(3)	
M13.10 <125>	bit status 1		13	1234	(1)	
M13.11 <126>	bit status 1		13	1234	(2)	
M13.12 <127>	bit status 1		13	1234	(3)	
M13.13 <128>	bit status 1		14	1234	(1)	
M13.14 <129>	bit status 1		14	1234	(2)	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
27	M13.15 <160>	SPOILER 1+4 FAULT/OFF	126 01 26		#13	7-25
27	M13.16 <161>	SPOILER 3+2 FAULT/OFF	126 01 26		#14	7-25
27	M13.17 <162>	SPOILER 5 FAULT/OFF	126 01 26		#15	7-25
27	M13.18 <163>	SPOILER 6 FAULT/OFF	126 01 26		#16	7-25
27	M13.19 <164>	SPOILER 7 FAULT/OFF	126 01 26		#17	7-25
27	M13.20 <286>	GROUND SPOILER NOT ARMED	28V/OPEN			
27	M13.21 <287>	SPEED BRAKE HANDLE	Pot			
34	M14.01 <101>	TAT	211 XX 25	29	11	5

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M13.15 <160>	bit status 1		45	1234	(1)	
M13.16 <161>	bit status 1		45	1234	(2)	
M13.17 <162>	bit status 1		45	1234	(3)	
M13.18 <163>	bit status 1		46	1234	(1)	
M13.19 <164>	bit status 1		46	1234	(2)	
M13.20 <286>	bit status 1 (28V)		39	1234	(1)	
M13.21 <287>	0 to 50 Deg	+/- 0.5 %	24	1234	6	
M14.01 <101>	W +/- 512 Deg C - 60 to + 99 Deg C	R 0.25 Deg C +/- 0.2 Deg C	51	0204	10	

ATA	NO	PARAMETER	SIGNAL TYPE / LABEL / SDI / EQ	SIGN BIT	DATA BITS	UPD/SEC
		DFDAU PARAMETER LIST (PART 1)	INPUT CHARACTERISTICS			
22	M15A01 <32>	A/P CMD #1	146 XX 01		#12	16
22	M15A02 <33>	A/P CWS #1	146 XX 01		#11	16
22	M15A03 <2567>	FD #1	146 XX 01		#13	16
22	M15A04 <35>	A/P CMD #2	146 XX 01		#12	16
22	M15A05 <36>	A/P CWS #2	146 XX 01		#11	16
22	M15A06 <2667>	FD #2	146 XX 01		#13	16
22	M15A07 <75>	ô > ALTITUDE ACQ (1)	274 XX 01		2	16
22	M15A08 <85>	/	274 XX 01			
22	M15A09 <78>	ô > A/P ALT HOLD (1)	274 XX 01		2	16
22	M15A10 <88>	/	274 XX 01			
22	M15A11 <76>	ô > G/S CAPTURE (1)	274 XX 01		2	16
22	M15A12 <86>	/	274 XX 01			
22	M15A13 <173>	ô > G/S TRK (1)	274 XX 01		2	16
22	M15A14 <174>	/	274 XX 01			
22	M15A15 <175>	ô > SPD CLIMB (1)	274 XX 01		3	16
22	M15A16 <176>	/	274 XX 01			
22	M15A17 <177>	ô > SPD DESCENT (1)	274 XX 01		3	16
22	M15A18 <178>	/	274 XX 01			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15A01 <32>	bit status 1		03	1234	(1)	
M15A02 <33>	bit status 1		03	1234	(2)	
M15A03 <2567>	bit status 1		03	1234	(3)	
M15A04 <35>	bit status 1		35	1234	(1)	
M15A05 <36>	bit status 1		35	1234	(2)	
M15A06 <2667>	bit status 1		35	1234	(3)	
M15A07 <75>	ô > bit 13 and 29		17	1234	4	
M15A08 <85>	/					
M15A09 <78>	ô > bit 13 and 22		17	1234	4	
M15A10 <88>	/					
M15A11 <76>	ô > bit 19 and 29		17	1234	4	
M15A12 <86>	/					
M15A13 <173>	ô > bit 19 and 22		17	1234	4	
M15A14 <174>	/					
M15A15 <175>	ô bit 10 > and 11		17	1234	4	
M15A16 <176>	/ and not 12					
M15A17 <177>	ô bit 9 > and 11		17	1234	4	
M15A18 <178>	/ and not 12					

ATA	NO	PARAMETER	DFDAU PARAMETER LIST (PART 1) INPUT CHARACTERISTICS SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
22	M15A19 <179>	ô > MACH CLIMB	274 XX 01		3	16
22	M15A20 <180>	/	274 XX 01			
22	M15A21 <181>	ô > MACH DESCENT	274 XX 01		3	16
22	M15A22 <182>	/	274 XX 01			
22	M15A23 <183>	ô > PROFILE ALT	274 XX 01		3	16
22	M15A24 <184>	/	274 XX 01			
22	M15A25 <185>	ô > PROFILE CLIMB	274 xx 01		2	16
22	M15A26 <186>	/	274 xx 01			
22	M15A27 <187>	ô > PROFILE DESCENT	274 xx 01		2	16
22	M15A28 <188>	/	274 xx 01			
22	M15A29 <189>	ô > PROFILE SPEED PHASE	274 xx 01		2	16
22	M15A30 <190>	/	274 xx 01			
22	M15A31 <191>	ô > PROFILE MACH PHASE	274 xx 01		2	16
22	M15A32 <192>	/	274 xx 01			
22	M15A33 <2526>	ô > VERTICAL SPEED	274 xx 01		#14	16
22	M15A34 <2626>	/	274 xx 01			
22	M15A35 <2529>	ô > PITCH TAKE OFF	274 xx 01		#17	16
22	M15A36 <2629>	/	274 xx 01			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15A19	ô bit 10					
<179>	> and 18		17	1234	4	
M15A20	/ and not 12					
<180>						
M15A21	ô bit 9					
<181>	> and 18		17	1234	4	
M15A22	/ and not 12					
<182>						
M15A23	ô bit 12					
<183>	> and not 9		17	1234	4	
M15A24	/ and not 10					
<184>						
M15A25	ô					
<185>	> bit 12 and 10		17	1234	4	
M15A26	/					
<186>						
M15A27	ô					
<187>	> bit 12 and 9		17	1234	4	
M15A28	/					
M15A29						
<189>	ô		17	1234	4	
M15A30	> bit 11 and 12					
<190>	/					
M15A31						
<191>	ô		17	1234	4	
M15A32	> bit 18 and 12					
<192>	/					
M15A33						
<2526>	ô		17	1234	4	
M15A34	>bit status 1					
<2626>	/					
M15A35						
<2529>	ô		17	1234	4	
M15A36	> bit ststus 1					
<2629>	/					

ATA	DFDAU PARAMETER LIST (PART 1) NO	PARAMETER	INPUT CHARACTERISTICS SIGNAL TYPE < LABEL NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
22	M15A37 <193>	ô > NAV MODE	275 xx 01		2	16
22	M15A38 <194>	/	275 xx 01			
22	M15A39 <195>	ô > LOC CAPT MODE	275 xx 01		2	16
22	M15A40 <196>	/	275 xx 01			
22	M15A41 <197>	ô > LOC TRK MODE	275 xx 01		2	16
22	M15A42 <198>	/	275 xx 01			
22	M15A43 <218>	ô > VOR CAPT MODE	275 xx 01		2	16
22	M15A44 <219>	/	275 xx 01			
22	M15A45 <220>	ô > VOR TRK MODE	275 xx 01		2	16
22	M15A46 <221>	/	275 xx 01			
22	M15A47 <2545>	ô > HDG MODE	275 xx 01		#12	16
22	M15A48 <2645>	/	275 xx 01			
22	M15A49 <61>	ô > HDG SEL	275 xx 01		#13	16
22	M15A50 <83>	/	275 xx 01			
22	M15A51 <2550>	ô > YAW TAKE OFF MODE	275 xx 01		#17	16
22	M15A52 <2650>	/	275 xx 01			
22	M15A53 <2551>	ô > ROLL GA MODE	275 xx 01		#18	16
22	M15A54 <2651>	/	275 xx 01			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15A37 <193>	ô > bit 11 and 23 /		19	1234	4	
M15A38 <194>						
M15A39 <195>	ô > bit 15 and 21 /		19	1234	4	
M15A40 <196>						
M15A41 <197>	ô > bit 15 and 23 /		19	1234	4	
M15A42 <198>						
M15A43 <218>	ô > bit 22 and 21 /		19	1234	4	
M15A44 <219>						
M15A45 <220>	ô > bit 22 and 23 /		19	1234	4	
M15A46 <221>						
M15A47 <2545>	ô > bit status 1 /		19	1234	4	
M15A48 <2645>						
M15A49 <61>	ô > bit status 1 /		19	1234	4	
M15A50 <83>						
M15A51 <2550>	ô > bit status 1 /		23	1234	1	
M15A52 <2650>						
M15A53 <2551>	ô > bit status 1 /		19	1234	4	
M15A54 <2651>						

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
22	M15A55 <2549>	ô > ROLL OUT MODE	275 xx 01		#16	16
22	M15A56 <2649>	/	275 xx 01			
22	M15A57 <2528>	ô > PITCH GA MODE	274 xx 01		#16	16
22	M15A58 <2628>	/	274 xx 01			
22	M15A59 <2527>	ô > FLARE	274 xx 01		#15	16
22	M15A60 <2627>	/	274 xx 01			
22	M15A61 <34>	ô > LAND TRK	146 xx 01		#14	16
22	M15A62 <37>	/	146 xx 01			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15A55 <2549>	ô > bit status 1 /		19	1234	4	
M15A56 <2649>						
M15A57 <2528>	ô > bit status 1 /		23	1234	2	
M15A58 <2628>						
M15A59 <2527>	ô > bit status 1 /		19	1234	4	
M15A60 <2627>						
M15A61 <34>	ô > bit status 1 /		31	1234	(1)	
M15A62 <37>						

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
22	M15B01 <2400>	ATS ARMING LEVER OFF	274 XX 03		#11	16
22	M15B02 <2403>	MANUAL THROTTLE ARMD	274 XX 03		#12	16
22	M15B03 <72>	AUTOTHROTTLE MODE ENGD	274 XX 03		#13	16
22	M15B04 <222>	ATS CLUTCHES OFF (TAKE OFF)	274 XX 03		#16	16
22	M15B05 <224>	VNAV MODE - PROFILE ENGD	274 XX 03		#17	16
22	M15B06 <226>	A/THR THRUST N 1 MODE ENGD (2)	274 XX 03		#18	16
22	M15B07 <71>	A/THR THRUST EPR MODE ENGAGED (3)	274 XX 03		#19	16
22	M15B08 <70>	MACH MODE ENGAGED	274 XX 03		#20	16
22	M15B09 <69>	SPEED MODE ENGAGED	274 XX 03		#21	16
22	M15B10 <73>	RETARD MODE ENGAGED	274 XX 03		#22	16
22	M15B11 <228>	ALPHA FLOOR MODE ENGAGED	274 XX 03		#28	16

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M15B01 <2400>	bit status 1		31	1234	(2)	
M15B02 <2403>	bit status 1		30	1234	(1)	
M15B03 <72>	bit status 1		30	1234	(2)	
M15B04 <222>	bit status 1		37	1234	(1)	
M15B05 <224>	bit status 1		37	1234	(2)	
M15B16 <226>	bit status 1		38	1234	(1)	
M15B17 <71>	bit status 1		38	1234	(1)	
M15B18 <70>	bit status 1		38	1234	(2)	
M15B19 <69>	bit status 1		40	1234	(1)	
M15B20 <73>	bit status 1		40	1234	(2)	
M15B21 <228>	bit status 1		40	1234	(3)	

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
31	M16.01 <11>	BODY LONG ACCEL	LLDC 0-5V			
31	M17.01 <10>	BODY LATERAL ACCEL	LLDC 0-5V			
27	M18A01 <16>	ELEVATOR POSITION	314 00 29	29	11	8
27	M18B01 <18>	ALL SPEED AILERON LH	310 01 29	29	11	8
27	M18B02 <19>	ALL SPEED AILERON RH	310 10 29	29	11	8
27	M18C01 <17>	RUDDER POSITION	312 00 29	29	11	8
27	M19.01 <15>	STABILIZER POSITION	315 00 29	29	11	8
34	M20.01 <5>	RADIO HEIGHT RA 1	164 01 07	29	16	25
34	M20.02 <97>	RADIO HEIGHT RA 2	164 XX 25	29	13	6
34	M21A01 <12>	GLIDE SLOPE DEVIATION 1	174 XX 10	29	12	16
34	M21A02 <861>	GLIDE SLOPE DEVIATION 2	174 XX 10	29	12	16

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M16.01			5	1234	10	
<11>	+/- 1 g	+/- 0.01g	21	1234	10	
			37	1234	10	
			53	1234	10	
M17.01			6	1234	10	
<10>	+/- 1 g	+/- 0.01 g	22	1234	10	
			38	1234	10	
			54	1234	10	
M18A01			7	1234	10	
<16>	W +/- 180 Deg	R 0.0879 Deg	23	1234	10	
	+ 30 to -15 Deg	+/- 1 Deg	39	1234	10	
			55	1234	10	
M18B01			15	1234	10	
<18>	W +/- 180 Deg	R 0.0879 Deg	47	1234	10	
	+/- 23 Deg	+/- 1 Deg				
M18B02			31	1234	10	
<19>	W +/- 180 Deg	R 0.0879 Deg	63	1234	10	
	+/- 23 Deg	+/- 1 Deg				
M18C01			30	1234	10	
<17>	W +/- 180 Deg	R 0.0879 Deg	62	1234	10	
	+/- 30 Deg	+/- 1 Deg				
M19.01			25	1234	9	
<15>	W +/- 180 Deg	R 0.0879 Deg				
	- 14 to + 2 Deg	+/- 0.25 Deg				
M20.01			11	1234	12	
<5>	W +/- 8192 ft	R 0.125 ft				
M20.02	- 20 to + 2500 ft	+/- 1.5 ft	26	0204	12	
<97>	W +/- 8192 ft	R 1 ft				
M21A01	- 20 to + 2500 ft	+/- 1.5 ft	34	1030	9	
<12>	W +/- 0.8 DDM	R 0.000195 DDM				
M21A02	+/- 0.8 DDM	+/- 0.003 DDM	34	0204	9	
<861>	W +/- 0.8 DDM	R 0.000195 DDM				
	+/- 0.8 DDM	+/- 0.003 DDM				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/SEC
		DFDAU PARAMETER LIST (PART 1)				
34	M22A01 <13>	LOCALIZER DEVIATION 1	173 XX 10	29	12	16
34	M22A02 <860>	LOCALIZER DEVIATION 2	173 XX 10	29	12	16
34	M23.01 <40>	OUTER MARKER ô ô				
34	M23.02 <41>	MIDDLE MARKER > /	222 XX 11		3	16
34	M23.03 <42>	INNER MARKER /				
	M24.01 <52>	ENG 1 FIRE	270 01 26		#22	7-25
	M24.02 <53>	ENG 2 FIRE	270 01 26		#23	7-25
	M24.03 <54>	APU FIRE	270 01 26		#21	7-25
	M24.04 <55>	SMOKE	270 01 26		#24	7-25
	M24.05 <103>	VMO / MMO OVERSPEED	126 01 26		#22	7-25
	M24.06 <281>	STALL	126 01 26		#24	7-25
	M24.07 <252>	GEAR NOT DOWN	377 01 26		#26	7-25
	M24.08 <253>	CABIN ALTITUDE	271 01 26		#29	7-25
	M24.09 <278>	CONFIGURATION	270 01 26		#28	7-25
	M24.10 <257>	ENG 1 OIL LO PR	377 01 26		#22	7-25
	M24.11 <258>	ENG 2 OIL LO PR	377 01 26		#24	7-25
	M24.12 <299>	OVERSPEED(VFE,VLE,VMO,MMO)	271 01 26		#24	7-25
	M24.13 <168>	AFT CG	126 01 26		#18	7-25
	M24.14 <300>	LAND ASAP	272 01 26		#19	7-25

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M22A01 <13>	W +/- 0.4 DDM	R 0.000097 DDM	33	1030	10	
M22A02 <860>	W +/- 0.4 DDM	R 0.000097 DDM	33	0204	10	
M23.01 <40>	+/- 0.4 DDM	+/- 0.004 DDM				
M23.02 <41>	bit 11 or 12 or 13		34	1234	(1)	
M23.02 <42>						
M24.01 <52>	bit status 1		47	1234	(1)	
M24.02 <53>	bit status 1		47	1234	(2)	
M24.03 <54>	bit status 1		39	1234	(2)	
M24.04 <55>	bit status 1		53	1234	(1)	
M24.05 <103>	bit status 1		53	1234	(2)	
M24.06 <281>	bit status 1		54	1234	(1)	
M24.07 <252>	bit status 1		54	1234	(2)	
M24.08 <253>	bit status 1		55	1234	(1)	
M24.09 <278>	bit status 1		62	1234	(1)	
M24.10 <254>	bit status 1		63	1234	(1)	
M24.11 <255>	bit status 1		63	1234	(2)	
M24.12 <299>	bit status 1		62	1234	(2)	
M24.13 <168>	bit status 1		7	1234	(1)	
M24.14 <300>	bit status 1		7	1234	(2)	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
32	M27.01 <149>	LDG SQUAT SWITCH NOSE	OPEN/0V-Sh			
32	M27.02 <147>	LDG SQUAT SWITCH LH	OPEN/0V-Sh			
32	M27.03 <148>	LDG SQUAT SWITCH RH	OPEN/0V-Sh			
34	M28.01 <288>	GPWS MODES	270 00 23		10	10
34	M29.01 <3>	ANGLE OF ATTACK (ADC 1)	221 XX 25	29	12	5
34	M29.02 <558>	ANGLE OF ATTACK (ADC 2)	221 XX 25	29	12	5
29	M30.01 <232>	HYD BLUE SYS NO LOW PR	28V/0V			
29	M30.02 <230>	HYD GRN SYS NO LOW PR	28V/0V			
29	M30.03 <231>	HYD YEL SYS NO LOW PR	28V/0V			
34	M31.01 <250>	GROUND SPEED	312 XX 04		15	32
32	M32.01 <267>	GEAR SELECTOR NOT UP	28V/0V			
32	M32.02 <270>	GEAR SELECTOR NOT DOWN	28V/0V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
M27.01 <149>	bit status 1 on ground		61	1234	(2)	
M27.02 <147>	bit status 1 on ground		61	1234	(3)	
M27.03 <148>	bit status 1 on ground		61	1234	(1)	
M28.01 <288>	bit pos 11 - 18,21,22		42	1234	(1)	
M29.01 <3>	(10) W +/- 180 Deg - 35 to + 85 Deg	R 0.0439 Deg +/- 0.25 Deg	3	1234	9	
M29.02 <558>	W +/- 180 Deg - 35 to + 85 Deg	R 0.0439 Deg +/- 0.25 Deg	35	1234	9	
M30.01 <232>			24	1030	(3)	
M30.02 <230>	bit status 1		24	1030	(4)	
M30.03 <231>	bit status 1		24	1030	(5)	
M31.01 <250>	bit status 1		42	1234	10	
M32.01 <267>	W 4096 Kts	R 0.125 Kts 1 Kts	41	0030	(4)	
M32.02 <270>	bit status 1 (28V) bit status 1 (28V)		41	0030	(3)	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
34	R01A01 <251>	DRIFT ANGLE	321 XX 04	29	15	32
34	R01B01 <590>	WIND SPEED	315 XX 04		15	16
34	R01C01 <592>	WIND DIRECTION	316 XX 04	29	15	16
34	R01D01 <274>	ô > PRES POS LAT FINE	310 XX 02			
34	R01D02 <344>	/ (1) (2)	310 XX 02	29	20	2(6)
34	R01D03 <275>	ô > PRES POS LAT COARSE	310 XX 02			10 (7)
34	R01D04 <345>	/ (1) (3)	310 XX 02			
34	R01D05 <276>	ô > PRES POS LONG FINE	311 XX 02			
34	R01D06 <346>	/ (1) (4)	311 XX 02	29	20	2(6)
34	R01D07 <277>	ô > PRES POS LONG COARSE	311 XX 02			10 (7)
34	R01D08 <347>	/ (1) (5)	311 XX 02			
32	R02.01 <284>	BREAKE PEDAL DEFLECTION LH	LLDC 0-5V			
32	R02.02 <285>	BREAKE PEDAL DEFLECTION RH	LLDC 0-5V			

DFDAU PARAMETER LIST (PART 1)

NO	INPUT CHARACTERISTICS RANGE	INPUT CHARACTERISTICS Accuracy	OUTPUT CHARACTERISTICS WORD	OUTPUT CHARACTERISTICS SUB FRAME	OUTPUT CHARACTERISTICS BITS	OUTPUT CHARACTERISTICS PARAMETER CODING
R01A01			41	1000	10	
<251>						
R01B01			41	0030	8	
<590>						
R01C01			41	0200	9	
<592>	W +/- 180 Deg	R 0.0055 Deg				
R01D01	+/- 90 Deg	2.4 Deg				
<274>	W 256 kts	R 0.0078 kts	56	0030	11	
R01D02	0 to 256 kts	9 kts				
<344>	W +/- 180 Deg	R 0.0055 Deg				
R01D03		10 Deg				
<275>	ô		56	1000	8	
R01D04	ô					
<345>	ô					
R01D05	>W N/S 180 Deg	R 0.00017 Deg				
<276>	/ N/S 90 Deg		57	0030	11	
R01D06	/					
<346>	/					
R01D07						
<277>	ô		57	1000	8	
R01D08	ô					
<347>	ô					
R02.01	>W E/W 180 Deg	R 0.00017 Deg	2	1234	6	
<284>	/ E/W 180 Deg					
R02.02	/		2	1234	6	
<285>	/					
	14 to 0 Deg	+/- 1 %				
	14 to 0 Deg	+/- 1 %				

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	R03A01 <152>	N2 ENG 1 (8)	LLDC 0-5V			
77	R03A02 <153>	N2 ENG 2 (8)	LLDC 0-5V			
77	R03B01 <154>	EGT ENG 1 (8)	LLDC 0-5V			
77	R03B02 <155>	EGT ENG 2 (8)	LLDC 0-5V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03A01 <152>			56	1000	8	
R03A02 <153>			57	1000	8	
	0 to 120 % rpm (8)	+/- 0.5 % rpm				
R03B01 <154>			51	1000	10	
	0 to 120 % rpm (8)	+/- 0.5 % rpm				
R03B02 <155>			59	1000	10	
	0 to 1000 Deg C (8)	+/- 10 Deg C				
	0 to 1000 Deg C (8)	+/- 10 Deg C				

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL NO. SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
77	R03A01 <152>	N2 ENG 1 (9)	344 10 1A		14	10
77	R03A02 <153>	N2 ENG 2 (9)	344 01 1A		14	10
78	R03B01 <154>	EGT ENG 1 (9)	345 10 1A		11	10
78	R03B02 <155>	EGT ENG 2 (9)	345 01 1A		11	10

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03A01 <152>			56	1000	8	
R03A02 <153>			57	1000	8	
	W 256 % rpm (9)	R 0.016 % rpm				
R03B01 <154>	30.8 to 115.3 % rpm	8 rpm	51	1000	10	
	W 256 % rpm (9)	R 0.016 % rpm				
	30.8 to 115.3 % rpm	8 rpm				
R03B02 <155>			59	1000	10	
	W 2048 Deg C (9)	R 1.0 Deg C				
	90.0 to 818.8 Deg C	+/- 3.9 Deg C				
	W 2048 Deg C (9)	R 1.0 Deg C				
	90.0 to 818.8 Deg C	+/- 3.9 Deg C				

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
77	R03A01 <152>	N2 ENG 1 (10)	344 00 1A		14	20
77	R03A02 <153>	N2 ENG 2 (10)	344 00 1A		14	20
78	R03B01 <154>	EGT (T 5) ENG 1 (10)	345 00 1A	29	12	5
78	R03B02 <155>	EGT (T 5) ENG 2 (10)	345 00 1A	29	12	5

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03A01 <152>			56	1000	8	
R03A02 <153>	W 256 % rpm (10) 0 to 120 % rpm	R 0.0156 % rpm 8 rpm	57	1000	8	
R03B01 <154>	W 256 % rpm (10) 0 to 120 % rpm	R 0.0156 % rpm 8 rpm	51	1000	10	
R03B02 <155>	W +/- 2048 Deg C (10) -80.0 to 1000 Deg C	R 0.5 Deg C +/- 4 Deg C	59	1000	10	
	W +/- 2048 Deg C (10) -80.0 to 1000 Deg C	R 0.5 Deg C +/- 4 Deg C				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ >	SIGN BIT	DATA BITS	UPD/ SEC
		DFDAU PARAMETER LIST (PART 1)				
73	R03C01 <156>	FUEL FLOW ENG 1	LLDC 0-5V			
73	R03C02 <157>	FUEL FLOW ENG 2	LLDC 0-5V			
77	R03D01 <112>	EVM FAN ENG 1 <N1>	135 01 29		8	4
77	R03D02 <113>	EVM FAN ENG 2 <N1>	135 10 29		8	4
77	R03D03 <114>	EVM TURBINE ENG 1 <N2>	136 01 29		8	4
77	R03D04 <115>	EVM TURBINE ENG 2 <N2>	136 10 29		8	4
73	R03E01 <301>	ENG 1 FUEL LEVER CLOSED	272 01 26		#13	7-25
73	R03E02 <302>	ENG 2 FUEL LEVER CLOSED	272 01 26		#14	7-25
28	R03F01 <303>	FIRE VALVE ENG 1 NFC	273 00 29		#12	4
28	R03F02 <304>	FIRE VALVE ENG 2 NFC	273 00 29		#11	4
79	R03G01 <134>	OIL QUANTITY ENG 1	073 01 29		11	8
79	R03G02 <135>	OIL QUANTITY ENG 2	073 10 29		11	8
79	R03H01 <1004>	OIL TEMP ENG 1	316 01 29		10	4
79	R03H02 <1005>	OIL TEMP ENG 2	316 10 29		10	4

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03C01 <156>			48	1234	12	
R03C02 <157>			32	1234	12	
R03D01 <112>	0 to 12 500 Kg/h	+/- 62.5 Kg/h	59	0200	6	
R03D02 <113>	0 to 12 500 Kg/h	+/- 62.5 Kg/h	59	0030	6	
R03D03 <114>	W 12.8 units 0 to 10 units	R 0.05 units	59	0200	6	
R03D04 <115>	W 12.8 units 0 to 10 units	R 0.05 units	59	0030	6	
R03E01 <301>	W 12.8 units 0 to 10 units	R 0.05 units	24	1234	(1)	
R03E02 <302>	W 12.8 units 0 to 10 units	R 0.05 units	24	1234	(2)	
R03F01 <303>	bit status 1		15	1234	(1)	
R03F02 <304>	bit status 1		15	1234	(2)	
R03G01 <134>	bit status 1		56	1000	8	
R03G02 <135>	bit status 1		57	1000	8	
R03H01 <1004>	W 102.4 Quart US 0 to 26 Quart US	R 0.05 Qt US	56	1000	8	
R03H02 <1005>	W 102.4 Quart US 0 to 26 Quart US	R 0.05 Qt US	57	1000	8	
	W 512 Deg C -7 to 300 Deg C	R 0.5 Deg C				
	W 512 Deg C -7 to 300 Deg C	R 0.5 Deg C				

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO. SDI EQ >	SIGN BIT	DATA BITS	UPD/SEC
79	R03J01 <1002>	OIL PRESSURE ENG 1	317 01 29		9	16
79	R03J02 <1003>	OIL PRESSURE ENG 2	317 10 29		9	16
34	R04A01 <254>	TRAFFIC ALERT VIS ANN	OPEN/OV-SH			
34	R04B01 <255>	RESOLUTION ADVISORY	270 10 35		12	2-3
34	R04C01 <256>	SENSITIVITY LEVEL	016 XX 35		3	5-10
34	R05.01 <365>	WINDSHEAR WARNING	270 XX 25		#25	5
34	R06A01 <366>	PILOT BARO SET FINE (12)ô >	234 01 06		5 (11)	8
34	R06A02 <367>	PILOT BARO SET COARSE(5)/				
34	R06B01 <368>	F/O BARO SET FINE (12)ô >	236 01 06		5 (11)	8
34	R06B02 <369>	F/O BARO SET COARSE(13)/				(
22	R07A01 <1604>	SELECTED ALTITUDE MANUAL	102 XX A1		16	16
22	R08A01 <1602>	SELECTED AIRSPEED	103 XX A1		11	16
34	R08B01 <1242>	ô > AIRSPEED TARGET (1)	103 XX 02		11	5
34	R08B02 <1282>	/	103 XX 02			
22	R09A01 <1608>	SELECTED MACH	106 XX A1		12	16

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R03J01 <1002>			56	1000	8	
R03J02 <1003>			57	1000	8	
R04A01 <254>	W 512 psi 0 to 400 psi	R 1.00 psi	27	1234	(1)	
R04B01 <255>	W 512 psi 0 to 400 psi	R 1.00 psi	43	1234	12	
R04C01 <256>	bit status 1		27	0004	3	
R05.01 <365>	bit 29 to 18 (3)		42	1234	(11)	
R06A01 <366>	bit 17 to 15 (3)		56	1000	8	
R06A02 <367>	bit status 1		57	1000	7	
R06B01 <368>	W 7999.9 mb	R 0.1 mb	56	1000	8	
R06B02 <369>	745 to 1050 mb	+/- 0.25 mb	57	1000	7	
R07A01 <1604>	W 7999.9 mb	R 0.1 mb	27	1000	10	
R08A01 <1602>	745 to 1050 mb	+/- 0.25 mb	27	0200	9	
R08B01 <1242>	W 65.536 ft	R 1 ft	27	0030	9	
R08B02 <1282>	W 512 Kts	R 0.25 Kts				
R09A01 <370>	ô > W 512 Kts /	R 0.25 Kts	59	0004	6	
	W 4.096 MACH	0.001 MACH				

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
34	R09B01 <1244>	ô > MACH TARGET (1)	106 XX 02		12	5
34	R09B02 <1284>	/	106 XX 02			
22	R10A01 <1600>	SELECTED VERTICAL SPEED	104 XX A1	29	10	16
22	R11.01 <1606>	SELECTED HEADING	101 XX A1	29	12	16
34	R12A01 <1246>	ô > BEARING TO WAYPOINT (1)	115 XX 01	29	12	20
34	R12A02 <1286>	/	115 XX 01			
34	R12A03 <263>	SELECTED COURSE #1	100 XX 11	29	9	20
34	R12A04 <1411>	SELECTED COURSE #2	100 XX 11	29	9	20
34	R12B01 <238>	CAPT SEL FLIGHT PATH ANGLE	273 XX C5	19	7 (14)	10
34	R12B02 <239>	F/O SEL FLIGHT PATH ANGLE	273 XX C5	19	7 (14)	10
34	R13.01 <341>	PILOT SELECTED DH FINE ô (15) >	370 XX 25		16	5
34	R13.02 <342>	PILOT SELECTED DH COARSE/ (16)				
34	R13.03 <348>	F/O SELECTED DH FINE ô (15) >	370 XX 25		16	5
34	R13.04 <349>	F/O SELECTED DH COARSE / (16)				

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R09B01 <372>	ô		59	0004	6	
R09B02 <373>	> W 4.096 MACH /	R 0.001 MACH				
R10A01 <374>	W +/-16.384 ft/min	R 16 ft/min	27	0004	8	
R11.01 <387>	W +/- 180 Deg	R 0.044 Deg	56	1000	8	
R12A01 <1246>	ô		56	0200	9	
R12A02 <1286>	> W +/- 180 Deg /	R 0.044 Deg				
R12A03 <263>	M +/- 180 Deg	R 0.35 Deg	56	1000	8	
R12A04 <1411>	0 to 360 Deg W +/- 180 Deg	 R 0.35 Deg	57	1000	8	
R12B01 <238>	0 to 360 Deg W +/- 12.8 DEG	 R 0.1 DEG	56	1000	8	
R12B02 <239>	W +/- 12.8 DEG	R 0.1 DEG	57	1000	8	
R13.01 <341>			57	1000	8	
R13.02 <342>	W 8192 ft	R 0.125 Deg	56	1000	8	
R13.03 <348>			57	1000	8	
R13.04 <349>	W 8192 ft	R 0.125 Deg	56	1000	8	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
34	R14A01 <416>	NAV or VOR	272 XX C5		#25	10
34	R14A02 <417>	ILS	272 XX C5 273 XX C5		2	10
34	R14A03 <418>	SPARE	272 XX C5 273 XX C5		2	10
34	R14A04 <419>	PLAN	272 XX C5		#14	10
34	R14A05 <420>	ROSE	272 XX C5		#28	10
34	R14A06 <421>	ARC	273 XX C5		#23	10
34	R14A07 <422>	MAP	272 XX C5		#11	10
34	R14A08 <423>	DISTANCE 15 NM	273 XX C5		2	10
34	R14A09 <424>	DISTANCE 30 NM	273 XX C5		2	10
34	R14A10 <425>	DISTANCE 60 NM	273 XX C5		2	10
34	R14A11 <426>	DISTANCE 120 NM	273 XX C5		2	10
34	R14A12 <427>	DISTANCE 240 NM	273 XX C5		2	10
34	R14A13 <428>	PILOT PFD FAULT	350 XX 25		#11	10
34	R14A14 <429>	PILOT ND FAULT	350 XX 25		#16	10
34	R14A15 <430>	PILOT CP FAULT	350 XX 25		#14	10
34	R14A16 <431>	FNSG 1 or 3 FAULT	350 XX 25		#18	10

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R14A01 <416>			5	0200	2	
R14A02 <417>	bit status 0		5	0200	2	
R14A03 <418>	bit 25 = 1 and bit 21 = 0		5	0200	2	
R14A04 <419>	bit 25 = 1 and bit 21 = 1		19	1000	3	
R14A05 <420>	bit status 1		19	1000	3	
R14A06 <421>	bit status 1		19	1000	3	
R14A07 <422>	bit status 1		19	1000	3	
R14A08 <423>	bit status 1		19	1000	3	
R14A09 <424>	bit 24 and 25		19	1000	3	
R14A10 <425>	bit 25 and 26		19	1000	3	
R14A11 <426>	bit 26 and 27		19	1000	3	
R14A12 <427>	bit 27 and 28		19	1000	3	
R14A13 <428>	bit 28 and 29		5	1000	(2)	
R14A14 <429>	bit status 1		5	1000	(1)	
R14A15 <430>	bit status 1		6	1000	(2)	
R14A16 <431>	bit status 1		6	1000	(1)	
	bit status 1					

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
34	R14B01 <432>	NAV or VOR	272 XX C5		#25	10
34	R14B02 <433>	ILS	272 XX C5 273 XX C5		2	10
34	R14B03 <434>	SPARE	272 XX C5 273 XX C5		2	10
34	R14B04 <435>	PLAN	272 XX C5		#14	10
34	R14B05 <436>	ROSE	272 XX C5		#28	10
34	R14B06 <437>	ARC	273 XX C5		#23	10
34	R14B07 <438>	MAP	272 XX C5		#11	10
34	R14B08 <439>	DISTANCE 15 NM	273 XX C5		2	10
34	R14B09 <446>	DISTANCE 30 NM	273 XX C5		2	10
34	R14B10 <447>	DISTANCE 60 NM	273 XX C5		2	10
34	R14B11 <472>	DISTANCE 120 NM	273 XX C5		2	10
34	R14B12 <473>	DISTANCE 240 NM	273 XX C5		2	10
34	R14B13 <474>	FIRST OFFICER PFD FAULT	350 XX 25		#12	10
34	R14B14 <475>	FIRST OFFICER ND FAULT	350 XX 25		#17	10
34	R14B15 <476>	FIRST OFFICER CP FAULT	350 XX 25		#15	10
34	R14B16 <477>	FNSG 2 or 3 FAULT	350 XX 25		#18	10

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R14B01 <432>			5	0004	2	
R14B02 <433>	bit status 0		5	0004	2	
R14B03 <434>	bit 25 = 1 and bit 21 = 0		5	0004	2	
R14B04 <435>	bit 25 = 1 and bit 21 = 1		19	0030	3	
R14B05 <436>	bit status 1		19	0030	3	
R14B06 <437>	bit status 1		19	0030	3	
R14B07 <438>	bit status 1		19	0030	3	
R14B08 <439>	bit status 1		19	0030	3	
R14B09 <446>	bit 24 and 25		19	0030	3	
R14B10 <447>	bit 25 and 26		19	0030	3	
R14B11 <472>	bit 26 and 27		19	0030	3	
R14B12 <473>	bit 27 and 28		19	0030	3	
R14B13 <474>	bit 28 and 29		5	0030	(2)	
R14B14 <475>	bit status 1		5	0030	(1)	
R14B15 <476>	bit status 1		6	0030	(2)	
R14B16 <477>	bit status 1		6	0030	(1)	

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
DFDAU PARAMETER LIST (PART 1)						
31	R15.01 <391>	ECAM CP.CODE 0	OPEN/0V-Sh			
31	R15.02 <392>	ECAM CP.CODE 1	OPEN/0V-Sh			
31	R15.03 <393>	ECAM CP.CODE 2	OPEN/0V-Sh			
31	R15.04 <394>	ECAM CP.CODE 3	OPEN/0V-Sh			
31	R15.05 <383>	ECAM DU WARN FAULT	OPEN/0V-Sh			
31	R15.06 <384>	ECAM DU WARN OFF	28V/OPEN			
31	R15.07 <385>	ECAM DU SYS FAULT	OPEN/0V-Sh			
31	R15.08 <386>	ECAM DU SYS OFF	28V/OPEN			
34	R16.01 <236>	DME 1 DISTANCE	201 xx 09		19	6
34	R16.02 <237>	DME 2 DISTANCE	201 xx 09		19	6
24	R17.01 <377>	AC BUS 1 OFF	28/0VOPEN			
24	R17.02 <297>	AC BUS 2 OFF	270 00 29		2	4
24	R18.01 <298>	DC NORMAL BUS OFF	276 01 26		#17	7-25

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R15.01 <391>			24	0200	(3)	
R15.02 <392>	(2)		24	0200	(4)	
R15.03 <393>	(2)		24	0200	(5)	
R15.04 <394>	(2)		24	0200	(6)	
R15.05 <383>	(2)		50	0200	(1)	
R15.06 <384>	bit status 0 (GND)		50	0200	(2)	
R15.07 <385>	bit status 1 (28V)		50	0200	(3)	
R15.08 <386>	bit status 0 (GND)		50	0200	(4)	
R16.01 <236>	bit status 1 (28V)		18	0200	11	
R16.02 <237>	W 799.99 NM 0 to 300 NM	R 0.01 NM 1 NM	18	0004	11	
R17.01 <377>	W 799.99 NM 0 to 300 NM	R 0.01 NM 1 NM	41	0200	(1)	
R17.02 <297>	bit status 1 (28V)		41	0200	(2)	
R18.01 <298>	not bit 24 and not bit 25 bit status 1		41	0200	(3)	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
21	R19.01 <132>	BLEED VALVE ENG 1 OPEN	145 00 29		#12	4
21	R19.02 <133>	BLEED VALVE ENG 2 OPEN	145 00 29		#11	4
21	R19.03 <130>	X FEED VALVE CLOSED	145 00 29		#24	4
21	R19.04 <136>	PACK MAN MODE SEL 1	145 00 29		#26	4
21	R19.05 <137>	PACK MAN MODE SEL 2	145 00 29		#25	4
30	R19.06 <138>	INLET AI VALVE ENG 1 OPEN	OPEN/OV-Sh			
30	R19.07 <139>	INLET AI VALVE ENG 2 OPEN	OPEN/OV-Sh			
30	R19.08 <140>	WING AI VALVE LH NORM UNCL	OPEN/OV-Sh			
30	R19.09 <141>	WING AI VALVE RH NORM UNCL	OPEN/OV-Sh			
30	R19.10 <158>	WING AI VALVE LH ALT UNCL	OPEN/OV-Sh			
30	R19.11 <159>	WING AI VALVE RH ALT UNCL	OPEN/OV-Sh			
80	R19.12 <142>	START V POS ENG 1	28V/0V			
80	R19.13 <143>	START V POS ENG 2	28V/0V			
21	R20.01 <131>	APU BLEED VALVE NOT OPEN	145 00 29		#15	4

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R19.01 <132>			19	1030	(5)	
R19.02 <133>	bit status 1		19	1030	(6)	
R19.03 <130>	bit status 1		41	1030	(2)	
R19.04 <136>	bit status 1		51	0204	(1)	
R19.05 <137>	bit status 1		51	0204	(2)	
R19.06 <138>	bit status 1		56	0200	(2)	
R19.07 <139>	bit status 1		56	0200	(3)	
R19.08 <140>	bit status 1		50	0004	(3)	
R19.09 <141>	bit status 1		50	0004	(2)	
R19.10 <158>	bit status 1		50	0004	(4)	
R19.11 <159>	bit status 1		50	0004	(1)	
R19.12 <142>	bit status 1		57	0030	(1)	
R19.13 <143>	bit status 1		56	0030	(1)	
R20.01 <131>	bit status 1		24	1030	(6)	
	bit status 1					

ATA	NO	PARAMETER	INPUT CHARACTERISTICS: SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
		DFDAU PARAMETER LIST (PART 1)				
27	R21.01 <279>	PITCH TRIM 1 FAULT	126 01 26		#27	7-25
27	R21.02 <280>	PITCH TRIM 2 FAULT	126 01 26		#28	7-25
27	R21.03 <22>	SLATS 1 + 2 FAULT	126 01 26		#11	7-25
27	R21.04 <23>	FLAPS 1 + 2 FAULT	126 01 26		#12	7-25
27	R21.05 <769>	YAW DAMPER 1 FAULT	126 01 26		#25	7-25
27	R21.06 <770>	YAW DAMPER 2 FAULT	126 01 26		#26	7-25
77	R21.07 <362>	EEC 1 FAULT (9)	350 00 1A		#15	5
77	R21.08 <363>	EEC 2 FAULT (9)	350 00 1A		#15	5
77	R22.01 <5107>	N1 CMD ENG 1 (8)	341 XX 1A		12	16
77	R22.02 <5157>	N1 CMD ENG 2 (8)	341 XX 1A		12	16
77	R22.03 <5215>	EPR CMD ENG 1 (9)	341 00 1A		13	20
77	R22.04 <5315>	EPR CMD ENG 1 (9)	341 00 1A		13	20
34	R23.01 <1259>	ô > N1 TARGET (1) (8)	343 XX 02		14	5
34	R23.02 <1299>	/	343 XX 02			
34	R23.03 <1260>	ô > EPR TARGET (1) (8)	343 XX 02		12	5
34	R23.04 <1300>	/	343 XX 02			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R21.01 <279>			57	0004	(8)	
R21.02 <280>	bit status 1		57	0004	(9)	
R21.03 <22>	bit status 1		57	0004	(12)	
R21.04 <23>	bit status 1		56	0200	(1)	
R21.05 <769>	bit status 1		57	0004	(10)	
R21.06 <770>	bit status 1		57	0004	(11)	
R21.07 <362>	bit status 1		57	0004	(6)	
R21.08 <363>	bit status 1		57	0004	(7)	
R22.01 <5107>	bit status 1		26	1030	6	
R22.02 <5157>	W 256 %rpm	R 0.0625 %rpm	26	1030	6	
R22.03 <5215>	20 to 120 %rpm W 256 %rpm	R 0.0625 %rpm	26	1030	6	
R22.04 <5315>	20 to 120 %rpm W 4	R 0.005	26	1030	6	
R23.01 <1259>	W 4	R 0.005	50	1000	6	
R23.02 <1299>	ô					
R23.03 <1260>	> W 256 %rpm /	R 0.015 %rpm	50	1000	6	
R23.04 <1300>	ô > W 4 /	R 0.001				

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
31	R24.01 <167>	CENTER OF GRAVITY	076 00 3E		14	5
28	R25.01 <170>	TRIM TANK QUANTITY	263 00 2C		15	1
34	R28.01 <260>	ILS 1 FREQUENCY	033 XX 10		4 (11)	5
34	R28.02 <864>	ILS 2 FREQUENCY	033 XX 10		4 (11)	5
34	R28.03 <266>	VOR 1 FREQUENCY	034 XX 11		4 (11)	5
34	R28.04 <259>	VOR 2 FREQUENCY	034 XX 11		4 (11)	5
34	R30.01 <104>	EVENT (depressed)	OPEN/OV-Sh			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
R24.01 <167>			57	1000	8	
R25.01 <170>	W 163.84 % MAC	R 0.01 % MAC	56	1000	8	
R28.01 <260>	W 131 072 lbs	R 4.0 lbs	49	1000	12	
R28.02 <864>	11 700 lbs W 8.00 to 11.95 MHz (17)	+/- 585 lbs R 0.01 MHz	49	0030	12	
R28.03 <266>	108.00 to 111.95 MHz W 8.00 to 11.95 MHz(17)	R 0.01 MHz	49	0200	12	
R28.04 <259>	108.00 to 111.95 MHz W 8.00 to 17.95 MHz (17)	R 0.01 MHz	49	0004	12	
R30.01 <104>	108.00 to 117.95 MHz W 8.00 to 17.95 MHz (17) 108.00 to 117.95 MHz bit status 0 button depressed	R 0.01 MHz	55	1234	(2)	

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
31	105	DOC DATA - DATE	260 00 31		11	7.5
34	106	ô	261 XX 02			
		> DOC DATA - FLIGHT NO			16	1
34	1292	/	261 XX 02			
34	107	ô				
		> DOC DATA - SPARE FOR				
34	1291	/ FLIGHT LEG				
31	108	A/C TYPE	OPEN/OV			
31	109	A/C TAIL NUMBER	OPEN/OV			
31	110	FLEET IDENTIFICATION	OPEN/OV			
31	111	BITE				
31	165	DFDAU PROGRAM IDENT				
34	166	ô	263 XX 02			
		> DATA BASE UPDATE			12	1
34	1309	/	263 XX 02			
34	271	ô	075 XX 02			
		> GROSS WEIGHT			15	5
34	1281	/	075 XX 02			
32	144	LDG DOWN AND LOCK LH	28V/OV-sh			
32	145	LDG DOWN AND LOCK RH	28V/OV-sh			
32	146	LDG DOWN AND LOCK NOSE	28V/OV-sh			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
105			41	0004	6 +5	
106 1292	0 to 31 Days 0 to 12 Months	1 Day 1 Month	41	0004	8 +8	
107 1291	> 0 to 9999	1	41	0004	12	
108			41	0004	6	
109			41	0004	8	
110 111	: For bit > status : see Table 3		41 57	0004 0200	4 12	
165			41	0004	8	
166 1309	12 BIT 8 BIT		41	0004	6 +6	
271 1281	> DAY, MONTH, CYCLE		41	0004	8 +7	
144 145	> W 1 310 720 lbs 154300 to 305560 lbs	R 40 lbs				
146	bit status 0					
	bit status 0					
	bit status 0					

DFDAU PARAMETER LIST (PART 1)			INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
27	169	PITCH TRIM WHEEL SYNC (1)	SYNCHRO			
31	272	PRINT (depressed)	28V/0V			
76	289	FUEL SHUT OFF VALVE ENG 1	28V/0V			
76	290	FUEL SHUT OFF VALVE ENG 2	28V/0V			
	350	SPARE 1	SYNCHRO			
	351	SPARE 2	SYNCHRO			
	352	SPARE 3	DCR 0-5V			
	353	SPARE 4	DCR 0-5V			
	354	SPARE 5	POT			
	355	SPARE 6	LLDC 0-5V			
77	356	FAN DISPLACEMENT ENG 1(4)	LLDC 0-5V			
77	357	FAN DISPLACEMENT ENG 2(4)	LLDC 0-5V			
79	358	OIL FLTR DIFF PR ENG 1	LLDC 0-5V			
79	359	OIL FLTR DIFF PR ENG 2	LLDC 0-5V			
	360	SPARE 11	LLDC 0-5V			
	361	SPARE 12	LLDC 0-5V			
	376	GPWS TEST	28V/0V			
	381	SPARE 18	28V/0V			
	382	SPARE 19	28V/0V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
169						
272	+ 61.9 to - 289 Deg	0.167 Deg				
289	bit status 1 (28V)					
290	bit status 1 (28V)					
350	valve open					
	bit status 1 (28V)					
351	valve open					
352						
353						
354						
355						
356						
357						
	0 to 15 mils (9)					
358						
	0 to 15 mils (9)					
359						
	0 to 80 psis	+/- 1 %				
360						
	0 to 80 psis	+/- 1 %				
361						
376						
381						
	bit status 0 (0V)					
382						

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
	383	SPARE 20	28V/0V			
	385	SPARE 22	28V/0V			
	387	SPARE 24	28V/0V			
	388	SPARE 25	28V/0V			
	389	DFDR PLAYBACK DEFINITION	28V/0V			
	397	SPARE 34	OPEN/0V-sh			
	398	SPARE 35	OPEN/0V-sh			
	399	SPARE 36	OPEN/0V-sh			
77	400	N1 ENG 1	LLDC 0-5V			
77	401	N1 ENG 2	LLDC 0-5V			
27	402	AILERON TRIM	SYNCHRO			
27	403	RUDDER TRIM	LLDC 0-5V			
77	404	N1 VIBR ANGLE ENG 1 (4)	LLDC 0-5V			
77	405	N1 VIBR ANGLE ENG 2 (4)	LLDC 0-5V			
34	406	SIDE SLIP ANGLE	POT			
27	440	RUDDER PEDAL POSITION	SYNCHRO			
27	441	ELEVATOR SPLIT UNC PITCH	28V/0V			
	442	SPARE 40	POT			
	443	SPARE 41	ACR 0-26V			
	444	SPARE 42	ACR 0-26V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
383						
385						
387						
388						
389						
397						
	bit status 1 (28V)					
398						
399						
400						
401						
	0 to 120 % rpm	+/- 0.5 % rpm				
402						
	0 to 120 % rpm	+/- 0.5 % rpm				
403						
	+/- 7 Deg	+/- 3 %				
404						
	+/- 21 Deg	+/- 1 %				
405						
	0 to 360 Deg	TBD				
406						
	0 to 360 Deg	TBD				
440						
	TBD	TBD				
441						
	+/- 99 mm	+/- 1,75 mm				
442						
	bit status 0 (0V)					
443						
444						

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL <NO.SDI EQ> >	SIGN BIT	DATA BITS	UPD/ SEC
	445	SPARE 43	SYNCHRO			
32	448	BRAKE/A-SKID SEL ALT/ON	28V/OPEN			
74	449	IGNITION A SELECTED	28V/OPEN			
74	450	IGNITION B SELECTED	28V/OPEN			
32	451	AUTO BRAKE MODE MAX	28V/OPEN			
32	452	AUTO BRAKE MODE MED	28V/OPEN			
32	453	AUTO BRAKE MODE LOW	28V/OPEN			
34	454	GPWS WARN MODE 1-4	28V/0V			
34	455	GPWS WARN G/S	28V/0V			
32	456	BRAKE/A-SKID SEL ALT/OFF	28V/OPEN			
32	457	BRAKE/A-SKID SEL NORMAL/ON	28V/OPEN			
32	458	WHEEL SPEED LH 1	LLDC 0-5V			
32	459	WHEEL SPEED LH 2	LLDC 0-5V			
32	460	WHEEL SPEED RH 3	LLDC 0-5V			
32	461	WHEEL SPEED RH 4	LLDC 0-5V			
32	462	WHEEL SPEED LH 5	LLDC 0-5V			
32	463	WHEEL SPEED LH 6	LLDC 0-5V			
32	464	WHEEL SPEED RH 7	LLDC 0-5V			
32	465	WHEEL SPEED RH 8	LLDC 0-5V			

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
445						
448						
449	bit status 1 (28 V)					
450	bit status 1 (28 V)					
451	bit status 1 (28 V)					
452	bit status 1 (28 V)					
453	bit status 1 (28 V)					
454	bit status 1 (28 V)					
455	bit status 0 (0V)					
456	bit status 0 (0V)					
457	bit status 1 (28 V)					
458	bit status 1 (28 V)					
459	0 to 100 m/s	+/- 3 %				
460	0 to 100 m/s	+/- 3 %				
461	0 to 100 m/s	+/- 3 %				
462	0 to 100 m/s	+/- 3 %				
463	0 to 100 m/s	+/- 3 %				
464	0 to 100 m/s	+/- 3 %				
465	0 to 100 m/s	+/- 3 %				

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
32	466	WHEEL SPEED LH NOSE	LLDC 0-5V			
32	467	WHEEL SPEED RH NOSE	LLDC 0-5V			
32	468	BRAKE PR TRANS LH GREEN SY	LLDC 0-5V			
32	469	BRAKE PR TRANS RH GREEN SY	LLDC 0-5V			
32	470	BRAKE V PRES LH YELLOW SYS	LLDC 0-5V			
32	471	BRAKE V PRES RH YELLOW SYS	LLDC 0-5V			
49	480	APU START SWITCH ON	28V/OPEN			
	481	SPARE 37	PROBE			
	482	SPARE 38	PROBE			
27	835	FLAPS POS (FEED BACK SYNC)	137 01 1B	29	12	5
75	1426	VSV POSITION ENG 1 (4)	072 00 1C	29	12	5
75	1427	VBV POSITION ENG 1 (4)	071 00 1C	29	12	5
75	1466	VSV POSITION ENG 2 (4)	072 00 1C	29	12	5
75	1467	VBV POSITION ENG 2 (4)	071 00 1C	29	12	5
75	1625	VSV POSITION ENG 1 (2)	072 10 1C	29	11	5
75	1637	3.0 BLD POS ENG 1 (2)	074 10 1C		10	5
75	1665	VSV POSITION ENG 2 (2)	072 01 1C	29	11	5
75	1677	3.0 BLD POS ENG 2 (2)	074 01 1C		10	5

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
466	0 to 100 m/s	+/- 3 %				
467						
468	0 to 100 m/s	+/- 3 %				
469	0 to 100 m/s	+/- 3 %				
470	0 to 200 bar	+/- 3 %				
471	0 to 200 bar	+/- 3 %				
480	0 to 2500 psi	+/- 5 %				
481	0 to 2500 psi	+/- 5 %				
482	bit status 1 (28V)					
835						
1426	W +/- 180 Deg	R 0.0439 Deg				
	0 to 41 Deg (3)	0.5 %				
1427	0 to 33.5 Deg (1)	0.5 %				
	W +/- 64 Deg	R 0.0156 Deg				
1466	- 6.5 to +44.515 Deg	+/- 0.5 % FS				
	W +/- 4 inch	R 0.001 inch				
1467	-0.03 to +1.823 in (2)	+/- 0.5 % FS				
	W +/- 64 Deg	R 0.0156 Deg				
1625	- 6.5 to +44.515 Deg	+/- 0.5 % FS				
	W +/- 4 inch	R 0.001 inch				
1637	-0.03 to +1.823 in (2)	+/- 0.5 % FS				
	W +/- 180 Deg	R 0.088 Deg				
1665	-40 to +10 Deg	+/- 0.2 Deg				
	W 4 inches	R 0.004 inch				
1677	0 to 1.886 inches	+/- 0.023 in				
	W +/- 180 Deg	R 0.088 Deg				
	-40 to +10 Deg	+/- 0.2 Deg				
	W 4 inches	R 0.004 inch				

	DFDAU PARAMETER LIST (PART 1)		INPUT CHARACTERISTICS			
ATA	NO	PARAMETER	SIGNAL TYPE < LABEL > <NO.SDI EQ>	SIGN BIT	DATA BITS	UPD/ SEC
	4050	V max	207 01 0A		16	8
	4150	V max	207 10 0A		16	8
77	4711	STATOR VANE ACTUATOR FB (SVA) ENG 1 (2)	325 00 1C	29	12	5
	4720	B 2.5 ENG 1 (2)	335 00 1C	29	12	5
77	5011	STATOR VANE ACTUATOR FB (SVA) ENG 2 (2)	325 00 1C	29	12	5
	5020	B 2.5 ENG 2 (2)	335 00 1C	29	12	5

DFDAU PARAMETER LIST (PART 1)

INPUT CHARACTERISTICS			OUTPUT CHARACTERISTICS			
NO	RANGE	Accuracy	WORD	SUB FRAME	BITS	PARAMETER CODING
	0 to 1.886 inches	+/- 0.023 in				
4050						
4150						
	W 1024 kts	R 0.0156 kts				
4711						
	W 1024 kts	R 0.0156 kts				
4720						
	W +/- 128 % open	R 0.0312% open				
5011	-5 to 105 % open					
	W +/- 128 % open	R 0.0312% open				
5020	-5 to 102 % open					
	W +/- 128 % open	R 0.0312% open				
	-5 to 105 % open					
	W +/- 128 % open	R 0.0312% open				
	-5 to 102 % open					

R **ON A/C 001-100,

(2)Summary of Input/Output Data
For the full description of the parameters, as well as for a better overlook, parts of the listed and additional information is summarized in a separate parameter description manual.
The tables show the summary of:
- DFDAU input pin assignment and
- DFDR word and frame assignment.
The summary of FWC labels shows the assignment of the discrete labels 126 and 270, as well as the principle of the warning message transmission.

(a)DFDAU Input Assignment
The connection between the sensors or respective computers and the DFDAU is shown in the inputs interconnection diagrams and the AIDS input diagrams and include analog and discrete parameters and digital ARINC 429 data buses.

(b)DFDR Word and Frame Assignment
The collected parameters are transmitted from the DFDAU to the DFDR and stored in defined word slots. These word slots are described in the separate parameter list. The summary of the word location is shown in the word frame. The whole frame with 4 subframes and 64 words per subframe will be repeated every 4 seconds (64 words/sec).
For parameters received via an ARINC 429 bus the relation between the DFDR bits and the corresponding ARINC 429 bit number is mentioned under the parameter name. The first mentioned ARINC 429 bit number is located at the DFDR MSB (bit no. 12) and normally the following ARINC 429 bits are located corresponding to the DFDR LSB (bit 3 or 1). For exceptions of this rule that ARINC bit number is mentioned, which is located on the next DFDR bit. Also the corresponding label, SDI and equipment code (EQ) of the parameter are listed in brackets.

Table 3 DFDR Word and Frame Assignment

SUBFRAME 1			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
01	0 0 1 0 0 1 0 0 0 1	1	1
02	LONGITUDINAL ACCELERATION		
03	MAGNETIC HEADING 29 (320-01-25) 20	MIDDLE Marker	OUTER Marker
04	NORMAL ACCELERATION	LDG dwn loc. LH	LDG dwn loc. RH
05	ALTITUDE FINE 23 (203-01-25)		12
06	CENTER OF GRAVITY (CGCC)		

SUBFRAME 1			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
	28 (076-003E)		17
07	SPARE POT		Rev pos eng 1
08		Start v eng 2	Start v eng 1
09	ALL SPEED AILERON LH 29 (310-01-29) 20	VHF 2	VHF 1
10	LOCALIZER DEVIATION 29 (173-01-10)		18
11	ANGLE OF ATTACK 29,27 (221-01-25) 19	SPOILER 1+4 fail	
12	THRUST LEVER ANGLE ENG 1 PMC1 28 (133-01-1A)		17
13	NORMAL ACCELERATION	LDG squ SW LH	EVENT marker
14			
15	LATERAL ACCELERATION	LDG squ sw nose	LDG squ sw RH
16	EVM FAN ENG 1 28 (135-01-29) 19	SPOILER 1 RH ret	SPOILER 1 LH ret
17	ROLL ANGLE 29 (325-01-25) 20	Flaps fault	Slats fault
18	LONGITUDINAL ACCELERATION		
19	COMPUTED AIRSPEED 28 (206-01-25)		17
20	NORMAL ACCELERATION	SPOILER 2 RH ret	SPOILER 2 LH ret
21	MACH 27 (205-01-25)		16
22			

SUBFRAME 1

WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
23	ALTITUDE COARSE 29 (203-01-25)		18
24			
25			
26	GLIDESLOPE DEVIATION 29 (174-01-10) 20	INNER Marker	VHF 3
27	RUDDER POSITION 29 (312-00-29) 20		
28	EVM FAN ENG 2 28 (135-10-29) 19	SPOILER 3 RH ret	SPOILER 3 LH ret
29	NORMAL ACCELERATION	Land tr AP2	Land tr AP1
30			
31	LATERAL ACCELERATION	CMD AP1	CWS AP1
32			
33	N2 ENG 1 IND		
34	LONGITUDINAL ACCELERATION		
35	FUEL FLOW ENG 1	SPOILER 3+2 fail	SPOILER 5 fail
36	NORMAL ACCELERATION	SPOILER 4 RH ret	SPOILER 4 LH ret
37	GMT - Minutes 22 (125-00-31)		11
38			

SUBFRAME 1				
WORD NO	MSB INPUT BITS (LABLE)		BIT 2	BIT 1
39	FLAPS POSITION		Inl ant ice e2	Inl ant ice e1
40	ALL SPEED AILERON RH		SPOILER 5 RH ret	SPOILER 5 LH ret
	29 (310-10-29)	20		
41	ELEVATOR POSITION			
	29 (314-00-29)	20		
42	OIL QUANTITY ENG 1		SPOILER 6 fail	SPOILER 7 fail
	27 (073-01-29)	18		
43	ANGLE OF ATTACK		SPOILER 6 RH ret	SPOILER 6 LH ret
	29,27 (221-01-25)	19		
44	RADIO HEIGHT			
	29,27 (164-01-07)			17
45	NORMAL ACCELERATION			
46	SPARE LLDC			
47	LATERAL ACCELERATION		HF 2	HF 1
48				
49				
50	LONGITUDINAL ACCELERATION			
51	PITCH ANGLE		CMD AP2	CWS AP2
	29,27 (324-01-25)	19		
52	NORMAL ACCELERATION		Rev unl eng 2	Rev unl eng 1
53	EGT ENG 1 IND			
54	TRIM TANK QUANTITY			
	25 (263-00-2C)			14
55	STABILIZER POSITION		AFT CG	

SUBFRAME 1			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
	29 (315-00-29) 20	WARN.	
56			
57		Pack mo sel 2	
58			
59	RUDDER POSITION 29 (312-00-29) 20	SPOILER 7 RH ret	SPOILER 7 LH ret
60	N1 ENG 1 PMC 1 28 (346-01-1A)		17
61	NORMAL ACCELERATION		Gear sl not dw
62			
63	LATERAL ACCELERATION		
64	SPARE ON/OFF		

SUBFRAME 2			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
01	0 1 0 1 1 0 1 1 1 0	0	0
02	LONGITUDINAL ACCELERATION		
03	MAGNETIC HEADING 29 (320-01-25) 20	Middle Marker	Outer Marker
04	NORMAL ACCELERATION	VMO/MMO	LDG dwn loc. no
05	ALTITUDE FINE 23 (203-01-25)		12
06	CENTER OF GRAVITY 28 (076-00-3E)		17
07	SPARE POT		Rev pos eng 2
08		Start v eng 2	Start v eng 1
09	ALL SPEED AILERON LH 29 (310-01-29) 20	VHF 2	VHF 1
10	LOCALIZER DEVIATION 29 (173-01-10)		18
11	ANGLE OF ATTACK 29,27 (221-01-25) 19	SPOILER 1+4 fail	
12	THRUST LEVER ANGLE ENG 2 PMC2 28 (133-10-1A) (133-01-1A)		17
13	NORMAL ACCELERATION	LDG squ SW LH	EVENT Marker
14			
15	LATERAL ACCELERATION	LDG squ sw nose	LDG squ sw RH
16	EVM TURBINE ENG 1 28 (136-01-29) 19	SPOILER 1 RH ret	SPOILER 1 LH ret
17	ROLL ANGLE	Flaps	Slats

SUBFRAME 2

WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
	29 (325-01-25) 20	fault	fault
18	LONGITUDINAL ACCELERATION		
19	COMPUTED AIRSPEED 28 (206-01-25)		17
20	NORMAL ACCELERATION	SPOILER 2 RH ret	SPOILER 2 LH ret
21	MAX. ALLOWABLE AIRSPEED 28 (207-01-25)		17
22			
23	DOC. and IDENTIFICATION DATA		
24			
25			
26	GLIDESLOPE DEVIATION 29 (174-01-10) 20	INNER Marker	VHF 3
27	RUDDER POSITION 29 (312-00-29) 20		
28	EVM TURBINE ENG 2 28 (136-10-29) 19	SPOILER 3 RH ret	SPOILER 3 LH ret
29	NORMAL ACCELERATION	Land tr AP 2	Land tr AP 1
30			
31	LATERAL ACCELERATION	CMD AP1	CWS AP1
32			
33	N2 Eng 2 IND		17

SUBFRAME 2			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
34	LONGITUDINAL ACCELERATION		
35		SPOILER 3+2 fail	SPOILER 5 fail
36	NORMAL ACCELERATION	SPOILER 4 RH ret	SPOILER 4 LH ret
37	DFDAU BITE		
38	PITCH TRIM WHEEL SYNC		
39	SLATS POSITION		
40	ALL SPEED AILERON RH 29 (310-10-29) 20	SPOILER 5 RH ret	SPOILER 5 LH ret
41	ELEVATOR POSITION 29 (314-00-29) 20		
42	SPARE LLDC	SPOILER 6 fail	SPOILER 7 fail
43	ANGLE OF ATTACK 29,27 (221-01-25) 19	SPOILER 6 RH ret	SPOILER 6 LH ret
44	RADIO HEIGHT 29,27 (164-01-07)		17
45	NORMAL ACCELERATION		
46	SPARE LLDC		
47	LATERAL ACCELERATION	HF 2	HF 1
48			
49			
50	LONGITUDINAL ACCELERATION		
51	PITCH ANGLE 29,27 (324-01-25) 19	CMD AP2	CWS AP2

SUBFRAME 2

WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
52	NORMAL ACCELERATION	Rev unl eng 2	Rev unl eng 1
53	EGT ENG 2 IND		17
54	AUX TANK 1 QUANTITY 25 (264-00-2C)		14
55	TAT 29,26 (211-01-25) 18	AFT CG WARN.	
56			
57			X Feed valve
58			
59	RUDDER POSITION 29 (312-00-29) 20	SPOILER 7 RH ret	SPOILER 7 LH ret
60	N1 ENG 2 PMC 2 28 (346-10-1A)		17
61	NORMAL ACCELERATION		SPARE ON/OFF
62			
63	LATERAL ACCELERATION		
64			SPARE ON/OFF

SUBFRAME 3

WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
01	0 0 1 0 0 1 0 0 0 1	1	1
02	LONGITUDINAL ACCELERATION		
03	MAGNETIC HEADING 29 (320-01-25) 20	Middle Marker	Outer Marker
04	NORMAL ACCELERATION	LDG dwn loc. LH	LDG dwn Loc. RH
05	ALTITUDE FINE 23 (203-01-25)		12
06	CENTER OF GRAVITY (CGCC) 28 (076-00-3E)		17
07		Bleed v eng 1	SPARE ON/OFF
08	SPARE LLDC	Start v eng 2	Start v eng 1
09	ALL SPEED AILERON LH 29 (310-01-29) 20	VHF 2	VHF 1
10	LOCALIZER DEVIATION 29 (173-01-10)		18
11	ANGLE OF ATTACK 29,27 (221-01-25) 19	SPOILER 1+4 fail	
12			
13	NORMAL ACCELERATION	LDG squ sw LH	EVENT marker
14			
15	LATERAL ACCELERATION	LDG squ sw nose	LDG squ sw RH
16	EVM FAN ENG 1 28 (135-01-29) 19	SPOILER 1 RH ret	SPOILER 1 LH ret
17	ROLL ANGLE 29 (325-01-25) 20	FLAPS fault	SLATS fault

SUBFRAME 3			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
18	LONGITUDINAL ACCELERATION		
19	COMPUTED AIRSPEED 28 (206-01-25)		17
20	NORMAL ACCELERATION	SPOILER 2 RH ret	SPOILER 2 LH ret
21	MACH 27 (205-01-25)		16
22			
23			
24			
25			
26	GLIDESLOPE DEVIATION 29 (174-01-10) 20	Inner Marker	VHF 3
27	RUDDER POSITION 29 (312-00-29) 20		
28	EVM FAN ENG 2 28 (135-10-29) 19	SPOILER 3 RH ret	SPOILER 3 LH ret
29	NORMAL ACCELERATION	Land tr AP 2	Land tr AP 1
30			
31	LATERAL ACCELERATION	CMD AP1	CWS AP1
32			
33			
34	LONGITUDINAL ACCELERATION		

SUBFRAME 3

WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
35	FUEL FLOW ENG 2	SPOILER 3+2 fail	SPOILER 5 fail
36	NORMAL ACCELERATION	SPOILER 4 RH ret	SPOILER 4 LH ret
37	GMT - Hours 30 (125-00-31)		19
38			
39	FLAPS POSITION	Inl ant ice e2	Inl ant ice e1
40	ALL SPEED AILERON RH 29 (310-10-29) 20	SPOILER 5 RH ret	SPOILER 5 LH ret
41	ELEVATOR POSITION 29 (314-00-29) 20		
42	OIL QUANTITY ENG 2 27 (073-10-29) 18	SPOILER 6 fail	SPOILER 7 fail
43	ANGLE OF ATTACK 29,27 (221-01-25) 19	SPOILER 6 RH ret	SPOILER 6 LH ret
44	RADIO HEIGHT 29,27 (164-01-07)		17
45	NORMAL ACCELERATION		
46	SPARE LLDC		
47	LATERAL ACCELERATION	HF 2	HF 1
48			
49			
50	LONGITUDINAL ACCELERATION		
51	PITCH ANGLE	CMD AP2	CWS AP2

SUBFRAME 3			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
	29,27 (324-01-25) 19		
52	NORMAL ACCELERATION	Rev unl eng 2	Rev unl eng 1
53			
54	AUX TANK 1 QUANTITY 25 (264-00-2C)		14
55	STABILIZER POSITION 29 (315-00-29) 20	AFT CG WARN	
56			
57		Pack no Sel 1.	APU BI valve
58			
59	RUDDER POSITION 29 (312-00-29) 20	SPOILER 7 RH ret	SPOILER 7 LH ret
60			
61	NORMAL ACCELERATION		SPARE ON/OFF
62			
63	LATERAL ACCELERATION		
64			SPARE ON/OFF

SUBFRAME 4			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
01	0 1 0 1 1 0 1 1 1 0	0	0
02	LONGITUDINAL ACCELERATION		
03	MAGNETIC HEADING 29 (320-01-25) 20	Middle Marker	Outer Marker
04	NORMAL ACCELERATION	VMO/MMO	LDG dwn loc. no
05	ALTITUDE FINE 23 (203-01-25)		12
06	CENTER OF GRAVITY (CGCC) 28 (076-00-3E)		17
07			
08	SPARE SYNCHRO	Start v eng 2	Start v eng 1
09	ALL SPEED AILERON LH 29 (310-01-29) 20	VHF 2	VHF 1
10	LOCALIZER DEVIATION 29 (173-01-10)		18
11	ANGLE OF ATTACK 29,27 (221-01-25) 19	SPOILER 1+4 fail	
12	SPARE POT		
13	NORMAL ACCELERATION	LDG squ sw LH	EVENT marker
14			
15	LATERAL ACCELERATION	LDG squ sw nose	LDG squ sw RH
16	EVM TURBINE ENG 1 28 (136-01-29) 19	SPOILER 1 RH ret	SPOILER 1 LH ret

SUBFRAME 4

WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
17	ROLL ANGLE 29 (325-01-25) 20	FLAPS fault	SLATS fault
18	LONGITUDINAL ACCELERATION		
19	COMPUTED AIRSPEED 28 (206-01-25)		17
20	NORMAL ACCELERATION	SPOILER 2 RH ret	SPOILER 2 LH ret
21	MAX. ALLOWABLE AIRSPEED 28 (207-01-25)		17
22			
23	FRAME COUNTER		
24			
25			
26	GLIDESLOPE DEVIATION 29 (174-01-10) 20	Inner Marker	VHF 3
27	RUDDER POSITION 29 (312-00-29) 20		
28	EVM TURBINE ENG 2 28 (136-10-29) 19	SPOILER 3 RH ret	SPOILER 3 LH ret
29	NORMAL ACCELERATION	Land tr AP 2	Land tr AP 1
30			
31	LATERAL ACCELERATION	CMD AP1	CWS AP1
32			
33			

SUBFRAME 4

WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
34	LONGITUDINAL ACCELERATION		
35		SPOILER 3+2 fail	SPOILER 5 fail
36	NORMAL ACCELERATION	SPOILER 4 RH ret	SPOILER 4 LH ret
37			
38	PITCH TRIM WHEEL SYNC		
39	SLATS POSITION	Wing ai RH alt	Wing ai LH alt
40	ALL SPEED AILERON RH 29 (310-10-29) 20	SPOILER 5 RH ret	SPOILER 5 LH ret
41	ELEVATOR POSITION 29 (314-00-29) 20		
42	SPACE LLDC	SPOILER 6 fail	SPOILER 7 fail
43	ANGLE OF ATTACK 29,27 (221-01-25) 19	SPOILER 6 RH ret	SPOILER 6 LH ret
44	RADIO HEIGHT 29,27 (164-01-07)		17
45	NORMAL ACCELERATION		
46	SPARE LLDC		
47	LATERAL ACCELERATION	HF 2	HF 1
48			
49			
50	LONGITUDINAL ACCELERATION		
51	PITCH ANGLE	CMD AP2	CWS AP2

SUBFRAME 4			
WORD NO	MSB INPUT BITS (LABLE)	BIT 2	BIT 1
	29,27 (324-01-25) 19		
52	NORMAL ACCELERATION	Rev unl eng 2	Rev unl eng 1
53			
54	DATA BASE UPDATE 29 (263-01-02)		18
55	TAT 29,26 (211-01-25) 18	AFT CG WARN.	
56			
57		Wing ai RH nor	Wing ai LH nor
58			
59	RUDDER POSITION 29 (312-00-29) 20	SPOILER 7 RH ret	SPOILER 7 LH ret
60			
61	NORMAL ACCELERATION		SPARE ON/OFF
62			
63	LATERAL ACCELERATION		
64			SPARE ON/OFF

(3)Detailed Description of Parameters
The parameter list in conjunction with the summary of input/output data describes sufficiently the parameters received by the DFDAU. For parameters which have abnormal or special characteristics, the detailed description of parameters is attached. Those characteristics are:

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WORD NO	SUBFRAME 1 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 2 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 3 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 4 MSB BIT 12 INPUT BITS LSB BIT 1	WORD NO
1	0 0 1 0 0 1 0 0 0 1 1 1	0 1 0 1 1 0 1 1 1 0 0 0	1 0 1 0 0 1 0 0 0 1 1 1	1 1 0 1 1 0 1 1 1 0 0 0	1
2	BRAKE PEDAL DEFLECTION LH; BRAKE PEDAL DEFLECTION RH	BRAKE PEDAL DEFLECTION LH; BRAKE PEDAL DEFLECTION RH	BRAKE PEDAL DEFLECTION LH; BRAKE PEDAL DEFLECTION RH	BRAKE PEDAL DEFLECTION LH; BRAKE PEDAL DEFLECTION RH	2
3	ANGLE OF ATTACK (ADC 1) 29,27 20; FD #1; A/P CWS #1; A/P CMD #1	ANGLE OF ATTACK (ADC 1) 29,27 20; FD #1; A/P CWS #1; A/P CMD #1	ANGLE OF ATTACK (ADC 1) 29,27 20; FD #1; A/P CWS #1; A/P CMD #1	ANGLE OF ATTACK (ADC 1) 29,27 20; FD #1; A/P CWS #1; A/P CMD #1	3
4	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	4
5	BODY LONG ACCEL; PILOT PFD FAULT; PILOT ND FAULT	BODY LONG ACCEL; EFIS PLT PFD	BODY LONG ACCEL; F/O PFD FAULT; F/O ND FAULT	BODY LONG ACCEL; EFIS F/O PFD	5
6	BODY LATERAL ACCEL; PILOT CP FAULT; FSNG 3 OR 1 FAULT	BODY LATERAL ACCEL	BODY LATERAL ACCEL; F/O CP FAULT; FSNG 3 OR 1 FAULT	BODY LATERAL ACCEL	6
7	ELEVATOR POSITION 29,26 18; LAND ASAP; AFT CG	ELEVATOR POSITION 29,26 18; LAND ASAP; AFT CG	ELEVATOR POSITION 29,26 18; LAND ASAP; AFT CG	ELEVATOR POSITION 29,26 18; LAND ASAP; AFT CG	7
8	EPR/N1 ENG 1 28 P&W 20 27 GE 19; SPOILER 5 RH RET; SPOILER 3 RH RET; SPOILER 5 LH RET	EPR/N1 ENG 1 28 P&W 20 27 GE 19; SPOILER 5 RH RET; SPOILER 3 RH RET; SPOILER 5 LH RET	EPR/N1 ENG 1 28 P&W 20 27 GE 19; SPOILER 5 RH RET; SPOILER 3 RH RET; SPOILER 5 LH RET	EPR/N1 ENG 1 28 P&W 20 27 GE 19; SPOILER 5 RH RET; SPOILER 3 RH RET; SPOILER 5 LH RET	8
9	MAGNETIC HEADING 29,28 20; HF; VHF	MAGNETIC HEADING 29,28 20; HF; VHF	MAGNETIC HEADING 29,28 20; HF; VHF	MAGNETIC HEADING 29,28 20; HF; VHF	9
10	COMPUTED AIRSPEED 27 19; SPOILER 5 LH RET; SPOILER 3 LH RET; SPOILER 5 LH RET	COMPUTED AIRSPEED 27 19; SPOILER 5 LH RET; SPOILER 3 LH RET; SPOILER 5 LH RET	COMPUTED AIRSPEED 27 19; SPOILER 5 LH RET; SPOILER 3 LH RET; SPOILER 5 LH RET	COMPUTED AIRSPEED 27 19; SPOILER 5 LH RET; SPOILER 3 LH RET; SPOILER 5 LH RET	10
11	RADIO HEIGHT RA 1 27 16	RADIO HEIGHT RA 1 27 16	RADIO HEIGHT RA 1 27 16	RADIO HEIGHT RA 1 27 16	11
12	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	12
13	PITCH ANGLE 29,27 20; SPOILER 2 RH RET; SPOILER 4 RH RET; SPOILER 3 RH RET	PITCH ANGLE 29,27 20; SPOILER 2 RH RET; SPOILER 4 RH RET; SPOILER 3 RH RET	PITCH ANGLE 29,27 20; SPOILER 2 RH RET; SPOILER 4 RH RET; SPOILER 3 RH RET	PITCH ANGLE 29,27 20; SPOILER 2 RH RET; SPOILER 4 RH RET; SPOILER 3 RH RET	13
14	ROLL ANGLE 29,28 20; SPOILER 4 RH RET; SPOILER 2 RH RET	ROLL ANGLE 29,28 20; SPOILER 4 RH RET; SPOILER 2 RH RET	ROLL ANGLE 29,28 20; SPOILER 4 RH RET; SPOILER 2 RH RET	ROLL ANGLE 29,28 20; SPOILER 4 RH RET; SPOILER 2 RH RET	14
15	ALL SPEED AILERON LH 29,26 18; FIRE VALVE ENG 2; FIRE VALVE ENG 1	ALL SPEED AILERON LH 29,26 18; FIRE VALVE ENG 2; FIRE VALVE ENG 1	ALL SPEED AILERON LH 29,26 18; FIRE VALVE ENG 2; FIRE VALVE ENG 1	ALL SPEED AILERON LH 29,26 18; FIRE VALVE ENG 2; FIRE VALVE ENG 1	15
16	TRA/TLA ENG 1 27 P&W 21 26 GE 22; TRA/TLA ENG 2 27 P&W 21 26 GE 22	TRA/TLA ENG 1 27 P&W 21 26 GE 22; TRA/TLA ENG 2 27 P&W 21 26 GE 22	TRA/TLA ENG 1 27 P&W 21 26 GE 22; TRA/TLA ENG 2 27 P&W 21 26 GE 22	TRA/TLA ENG 1 27 P&W 21 26 GE 22; TRA/TLA ENG 2 27 P&W 21 26 GE 22	16

DFDR Word and Frame Assignment (Sheet 1/4)
Figure 001

WORD NO	SUBFRAME 1 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 2 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 3 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 4 MSB BIT 12 — INPUT BITS — LSB BIT 1	WORD NO
17	SLATS POSITION; AFCS MODES MATRIX	SLATS POSITION; AFCS MODES MATRIX	SLATS POSITION; AFCS MODES MATRIX	SLATS POSITION; AFCS MODES MATRIX	17
18	DME 1 DISTANCE 29 19	DME 1 DISTANCE 29 19		DME 2 DISTANCE 29 19	18
19	EFIS PILOT PFD; BLEED VALVE ENG 2; BLEED VALVE ENG 1; AFCS MODES MATRIX	FLAPS POSITION; AFCS MODES MATRIX	EFIS F/O PFD; BLEED VALVE ENG 2; BLEED VALVE ENG 1; AFCS MODES MATRIX	FLAPS POSITION; AFCS MODES MATRIX	19
20	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	20
21	BODY LONG ACCEL; REVERSER IN POS ENG 1; REVERSER UNLOCK ENG 1	BODY LONG ACCEL; REVERSER IN POS ENG 1; REVERSER UNLOCK ENG 1	BODY LONG ACCEL; REVERSER IN POS ENG 1; REVERSER UNLOCK ENG 1	BODY LONG ACCEL; REVERSER IN POS ENG 1; REVERSER UNLOCK ENG 1	21
22	BODY LATERAL ACCEL; REVERSER IN POS ENG 2; REVERSER UNLOCK ENG 2	BODY LATERAL ACCEL; REVERSER IN POS ENG 2; REVERSER UNLOCK ENG 2	BODY LATERAL ACCEL; REVERSER IN POS ENG 2; REVERSER UNLOCK ENG 2	BODY LATERAL ACCEL; REVERSER IN POS ENG 2; REVERSER UNLOCK ENG 2	22
23	ELEVATOR POSITION 29,26 18; PITCH GA MODE; YAW TAKE OFF MODE	ELEVATOR POSITION 29,26 18; PITCH GA MODE; YAW TAKE OFF MODE	ELEVATOR POSITION 29,26 18; PITCH GA MODE; YAW TAKE OFF MODE	ELEVATOR POSITION 29,26 18; PITCH GA MODE; YAW TAKE OFF MODE	23
24	SPEED BRAKE HANDLE; APU BLEED VALVE; YEL HYD SYS NO LO PR; GRN HYD SYS NO LO PR; BLUE HYD SYS NO LO PR; ENG 2 FUEL LEVER; ENG 1 FUEL LEVER	SPEED BRAKE HANDLE; ECAM DISPLAY; ENG 2 FUEL LEVER; ENG 1 FUEL LEVER	SPEED BRAKE HANDLE; APU BLEED VALVE; YEL HYD SYS NO LO PR; GRN HYD SYS NO LO PR; BLUE HYD SYS NO LO PR; ENG 2 FUEL LEVER; ENG 1 FUEL LEVER	SPEED BRAKE HANDLE; ENG 2 FUEL LEVER; ENG 1 FUEL LEVER	24
25	STABILIZER POSITION 29,25 18	STABILIZER POSITION 29,25 18	STABILIZER POSITION 29,25 18	STABILIZER POSITION 29,25 18	25
26	THRUST CMD ENG 2 [N1] / [EPR] 27 22; THRUST CMD ENG 1 [N1] / [EPR] 27 22	RADIO HEIGHT RA 2 27 16	THRUST CMD ENG 2 [N1] / [EPR] 27 22; THRUST CMD ENG 1 [N1] / [EPR] 27 22	RADIO HEIGHT RA 2 27 16	26
27	SELECTED ALTITUDE (MANUAL) 28 19; TRAFFIC ALERT VIS ANN	SELECTED AIRSPEED (MANUAL) 28 20; TRAFFIC ALERT VIS ANN	AIRSPEED TARGET 28 20; TRAFFIC ALERT VIS ANN	SELECTED VERTICAL SPEED 29,27 21; SENSITIVITY LEVEL 17 15; TRAFFIC ALERT VIS ANN	27
28	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	28
29	PITCH ANGLE 29,27 20; SPOILER 3 LH RET; SPOILER 2 LH RET; SPOILER 1 LH RET	PITCH ANGLE 29,27 20; SPOILER 3 LH RET; SPOILER 2 LH RET; SPOILER 1 LH RET	PITCH ANGLE 29,27 20; SPOILER 3 LH RET; SPOILER 2 LH RET; SPOILER 1 LH RET	PITCH ANGLE 29,27 20; SPOILER 3 LH RET; SPOILER 2 LH RET; SPOILER 1 LH RET	29
30	RUDDER POSITION 29,26 18; AUTO THROTTLE MODE; MANUAL THROTTLE ARMD	RUDDER POSITION 29,26 18; AUTO THROTTLE MODE; MANUAL THROTTLE ARMD	RUDDER POSITION 29,26 18; AUTO THROTTLE MODE; MANUAL THROTTLE ARMD	RUDDER POSITION 29,26 18; AUTO THROTTLE MODE; MANUAL THROTTLE ARMD	30
31	ALL SPEED AILERON RH 29,26 18; ATS ARMING LEVER; LAND TRK	ALL SPEED AILERON RH 29,26 18; ATS ARMING LEVER; LAND TRK	ALL SPEED AILERON RH 29,26 18; ATS ARMING LEVER; LAND TRK	ALL SPEED AILERON RH 29,26 18; ATS ARMING LEVER; LAND TRK	31
32	FUEL FLOW ENG 2	FUEL FLOW ENG 2	FUEL FLOW ENG 2	FUEL FLOW ENG 2	32

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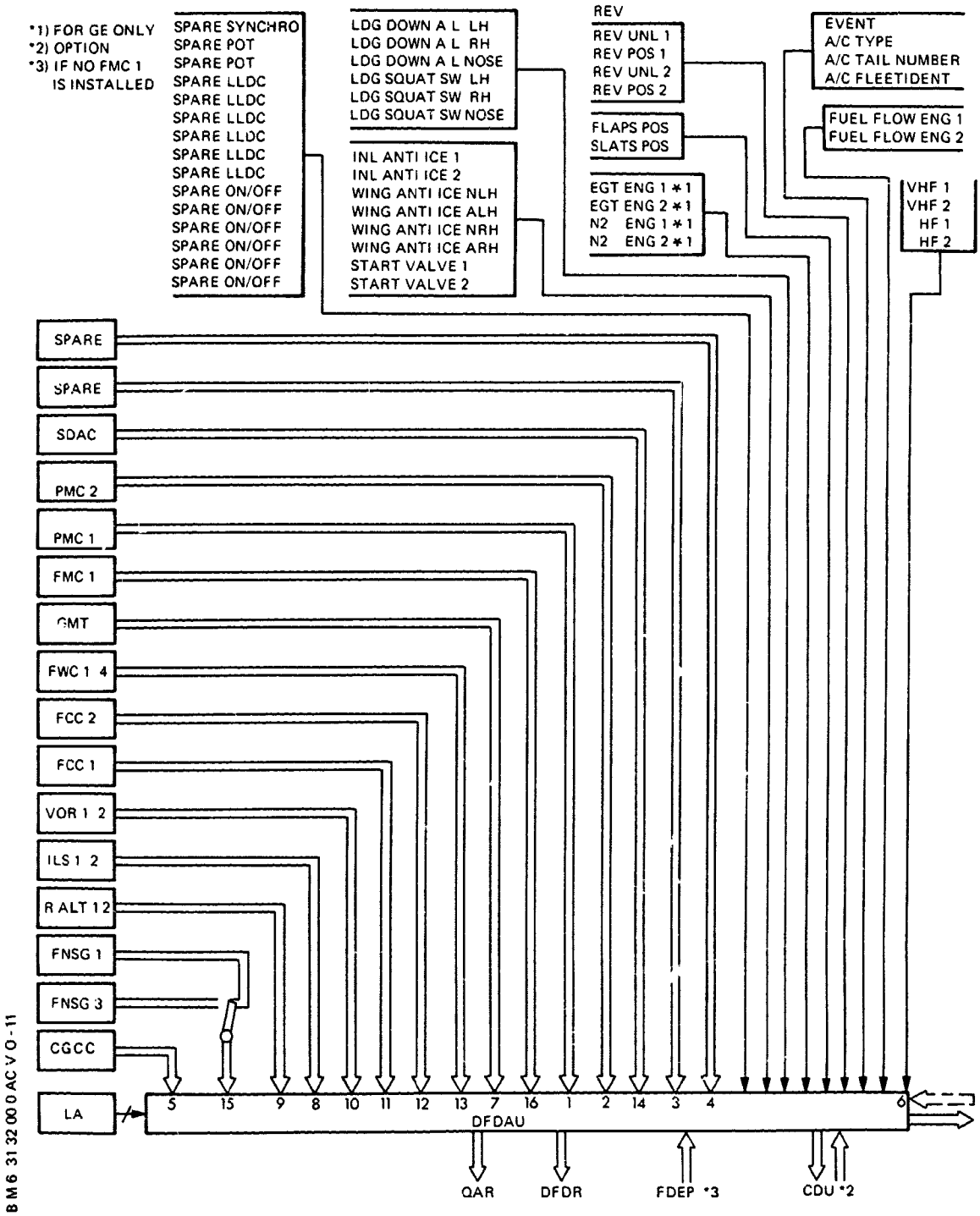
DFDR Word and Frame Assignment (Sheet 2/4)
Figure 001

WORD NO	SUBFRAME 1 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 2 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 3 MSB BIT 12 INPUT BITS LSB BIT 1	SUBFRAME 4 MSB BIT 12 INPUT BITS LSB BIT 1	WORD NO
33	LOCALIZER DEVIATION 1 29,28 20	LOCALIZER DEVIATION 2 29,28 20	LOCALIZER DEVIATION 1 29,28 20	LOCALIZER DEVIATION 2 29,28 20	33
34	GLIDE SLOPE DEVIATION 1 29,27 20 · MARKER BEACON PASSAGE	GLIDE SLOPE DEVIATION 2 29,27 20 · MARKER BEACON PASSAGE	GLIDE SLOPE DEVIATION 1 29,27 20 · MARKER BEACON PASSAGE	GLIDE SLOPE DEVIATION 2 29,27 20 · MARKER BEACON PASSAGE	34
35	ANGLE OF ATTACK (ADC 2) 29,27 20 · FD #2 · A/P CWS #2 · A/P CMD #2	ANGLE OF ATTACK (ADC 2) 29,27 20 · FD #2 · A/P CWS #2 · A/P CMD #2	ANGLE OF ATTACK (ADC 2) 29,27 20 · FD #2 · A/P CWS #2 · A/P CMD #2	ANGLE OF ATTACK (ADC 2) 29,27 20 · FD #2 · A/P CWS #2 · A/P CMD #2	35
36	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	36
37	BODY LONG ACCEL · VNAV MODE-PROFILE · ATS CLUT OFF	BODY LONG ACCEL · VNAV MODE-PROFILE · ATS CLUT OFF	BODY LONG ACCEL · VNAV MODE-PROFILE · ATS CLUT OFF	BODY LONG ACCEL · VNAV MODE-PROFILE · ATS CLUT OFF	37
38	BODY LATERAL ACCEL · MACH MODE ENGD · A/THR-THRUST MODE	BODY LATERAL ACCEL · MACH MODE ENGD · A/THR-THRUST MODE	BODY LATERAL ACCEL · MACH MODE ENGD · A/THR-THRUST MODE	BODY LATERAL ACCEL · MACH MODE ENGD · A/THR-THRUST MODE	38
39	ELEVATOR POSITION 29,26 18 · APU FIRE · GROUND SPOILER ARMED	ELEVATOR POSITION 29,26 18 · APU FIRE · GROUND SPOILER ARMED	ELEVATOR POSITION 29,26 18 · APU FIRE · GROUND SPOILER ARMED	ELEVATOR POSITION 29,26 18 · APU FIRE · GROUND SPOILER ARMED	39
40	EPR/N1 ENG 2 28 P&W 20 · 27 GE 19 · ALPHA FLOOR MODE · RETARD MODE ENGD · SPEED MODE ENGD	EPR/N1 ENG 2 28 P&W 20 · 27 GE 19 · ALPHA FLOOR MODE · RETARD MODE ENGD · SPEED MODE ENGD	EPR/N1 ENG 2 28 P&W 20 · 27 GE 19 · ALPHA FLOOR MODE · RETARD MODE ENGD · SPEED MODE ENGD	EPR/N1 ENG 2 28 P&W 20 · 27 GE 19 · ALPHA FLOOR MODE · RETARD MODE ENGD · SPEED MODE ENGD	40
41	DRIFT ANGLE 29,26 18 · X FEED VALVE	WIND DIRECTION 29,28 21 · DC NORMAL BUS OFF · AC BUS 2 OFF · AC BUS 1 OFF	WIND SPEED 28 21 · GEAR SELECTOR NOT UP · GEAR SELECTOR NOT DOWN · X FEED VALVE	SUPERFRAME 3	41
42	GROUND SPEED 26 17 · WIND-SHEAR WARNING · GPWS MODES	GROUND SPEED 26 17 · WIND-SHEAR WARNING · GPWS MODES	GROUND SPEED 26 17 · WIND-SHEAR WARNING · GPWS MODES	GROUND SPEED 26 17 · WIND-SHEAR WARNING · GPWS MODES	42
43	RESOLUTION ADVISORY 29 18	RESOLUTION ADVISORY 29 18	RESOLUTION ADVISORY 29 18	RESOLUTION ADVISORY 29 18	43
44	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	44
45	PITCH ANGLE 29,27 20 · SPOILER 2 FAULT · SPOILER 3+2 FAULT · SPOILER 4+1 FAULT	PITCH ANGLE 29,27 20 · SPOILER 2 FAULT · SPOILER 3+2 FAULT · SPOILER 4+1 FAULT	PITCH ANGLE 29,27 20 · SPOILER 2 FAULT · SPOILER 3+2 FAULT · SPOILER 4+1 FAULT	PITCH ANGLE 29,27 20 · SPOILER 2 FAULT · SPOILER 3+2 FAULT · SPOILER 4+1 FAULT	45
46	ROLL ANGLE 29,28 20 · SPOILER 5 FAULT · SPOILER 6 FAULT	ROLL ANGLE 29,28 20 · SPOILER 5 FAULT · SPOILER 6 FAULT	ROLL ANGLE 29,28 20 · SPOILER 5 FAULT · SPOILER 6 FAULT	ROLL ANGLE 29,28 20 · SPOILER 5 FAULT · SPOILER 6 FAULT	46
47	ALL SPEED AILERON LH 29,26 18 · ENG 2 FIRE · ENG 1 FIRE	ALL SPEED AILERON LH 29,26 18 · ENG 2 FIRE · ENG 1 FIRE	ALL SPEED AILERON LH 29,26 18 · ENG 2 FIRE · ENG 1 FIRE	ALL SPEED AILERON LH 29,26 18 · ENG 2 FIRE · ENG 1 FIRE	47
48	FUEL FLOW ENG 1	FUEL FLOW ENG 1	FUEL FLOW ENG 1	FUEL FLOW ENG 1	48

DFDR Word and Frame Assignment (Sheet 3/4)
Figure 001

WORD NO	SUBFRAME 1 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 2 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 3 MSB BIT 12 — INPUT BITS — LSB BIT 1	SUBFRAME 4 MSB BIT 12 — INPUT BITS — LSB BIT 1	WORD NO
49	ILS 1 FREQUENCY - WITHOUT BIT 18 - 27 — 15	VOR 1 FREQUENCY - WITHOUT BIT 18 - 27 — 15	ILS 2 FREQUENCY - WITHOUT BIT 18 - 27 — 15	VOR 2 FREQUENCY - WITHOUT BIT 18 - 27 — 15	49
50	THRUST TARGET [N1] / [EPR] 27 — 22	ECAM DU SYS OFF; ECAM DU SYS NO FAULT; ECAM DU WARN OFF; ECAM DU WARN NO FAULT	TIME MINUTES 23 — 18; TIME SECONDS 17 — 12	WING AI VALVE LH ALT; WING AI VALVE LH NORM; WING AI VALVE RH NORM; WING AI VALVE RH ALT	50
51	EGT ENG 1 (P&W) EGT IND ENG 1 (GE) 27 — 18	TOTAL AIR TEMPERATURE 29,26 — 18; PACK MAN MODE SEL 2; PACK MAN MODE SEL 1	SUPERFRAME 4	TOTAL AIR TEMPERATURE 29,26 — 18; PACK MAN MODE SEL 2; PACK MAN MODE SEL 1	51
52	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	52
53	BODY LONG ACCEL; VMO/MMO OVERSPD; SMOKE	BODY LONG ACCEL; VMO/MMO OVERSPD; SMOKE	BODY LONG ACCEL; VMO/MMO OVERSPD; SMOKE	BODY LONG ACCEL; VMO/MMO OVERSPD; SMOKE	53
54	BODY LATERAL ACCEL; GEAR NOT LOCKED DOWN; STALL	BODY LATERAL ACCEL; GEAR NOT LOCKED DOWN; STALL	BODY LATERAL ACCEL; GEAR NOT LOCKED DOWN; STALL	BODY LATERAL ACCEL; GEAR NOT LOCKED DOWN; STALL	54
55	ELEVATOR POSITION 29,26 — 18; EVENT; CABIN ALTITUDE	ELEVATOR POSITION 29,26 — 18; EVENT; CABIN ALTITUDE	ELEVATOR POSITION 29,26 — 18; EVENT; CABIN ALTITUDE	ELEVATOR POSITION 29,26 — 18; EVENT; CABIN ALTITUDE	55
56	SUPERFRAME 1	BEARING TO WP 29,28 — 21; INLET AI VALVE ENG 2; INLET AI VALVE ENG 1; FLAPS FAULT	PRES POS LAT FINE 20 — 10; START V POS ENG 2	FRAME COUNTER	56
57	SUPERFRAME 2	DFDAU BITE	PRES POS LONG FINE 21 — 11; START V POS ENG 1; SLATS FAULT; YAW DAMPER 2 FAULT; YAW DAMPER 1 FAULT; PITCH TRIM 2 FAULT; PITCH TRIM 1 FAULT; EEC 2 FAULT; EEC 1 FAULT	ALTITUDE COARSE 29,27 — 24	57
58	ALTITUDE FINE 24 — 14	ALTITUDE FINE 24 — 14	ALTITUDE FINE 24 — 14	ALTITUDE FINE 24 — 14	58
59	EGT ENG 2 (P&W) EGT IND ENG 2 (GE) 27 — 18	EVM FAN ENG 1 [N1] 28 — 23; EVM TURBINE ENG 1 [N2] 28 — 23	EVM FAN ENG 2 [N1] 28 — 23; EVM TURBINE ENG 2 [N2] 28 — 23	SELECTED MACH (MANUAL) 26 — 21; MACH TARGET 26 — 21	59
60	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	NORMAL ACCELERATION	60
61	PITCH ANGLE 29,27 — 20; LDG SQUAT SW LH; LDG SQUAT SW NOSE; LDG SQUAT SW RH	PITCH ANGLE 29,27 — 20; LDG SQUAT SW LH; LDG SQUAT SW NOSE; LDG SQUAT SW RH	PITCH ANGLE 29,27 — 20; LDG SQUAT SW LH; LDG SQUAT SW NOSE; LDG SQUAT SW RH	PITCH ANGLE 29,27 — 20; LDG SQUAT SW LH; LDG SQUAT SW NOSE; LDG SQUAT SW RH	61
62	RUDDER POSITION 29,26 — 18; OVERSPD; CONFIGU-RATION	RUDDER POSITION 29,26 — 18; OVERSPD; CONFIGU-RATION	RUDDER POSITION 29,26 — 18; OVERSPD; CONFIGU-RATION	RUDDER POSITION 29,26 — 18; OVERSPD; CONFIGU-RATION	62
63	ALL SPEED AILERON RH 29,26 — 18; ENG 2 FAIL; ENG 1 FAIL	ALL SPEED AILERON RH 29,26 — 18; ENG 2 FAIL; ENG 1 FAIL	ALL SPEED AILERON RH 29,26 — 18; ENG 2 FAIL; ENG 1 FAIL	ALL SPEED AILERON RH 29,26 — 18; ENG 2 FAIL; ENG 1 FAIL	63
64					64

DFDR Word and Frame Assignment (Sheet 4/4)
Figure 001



AIDS Parameter Sources Block Diagram
Figure 002

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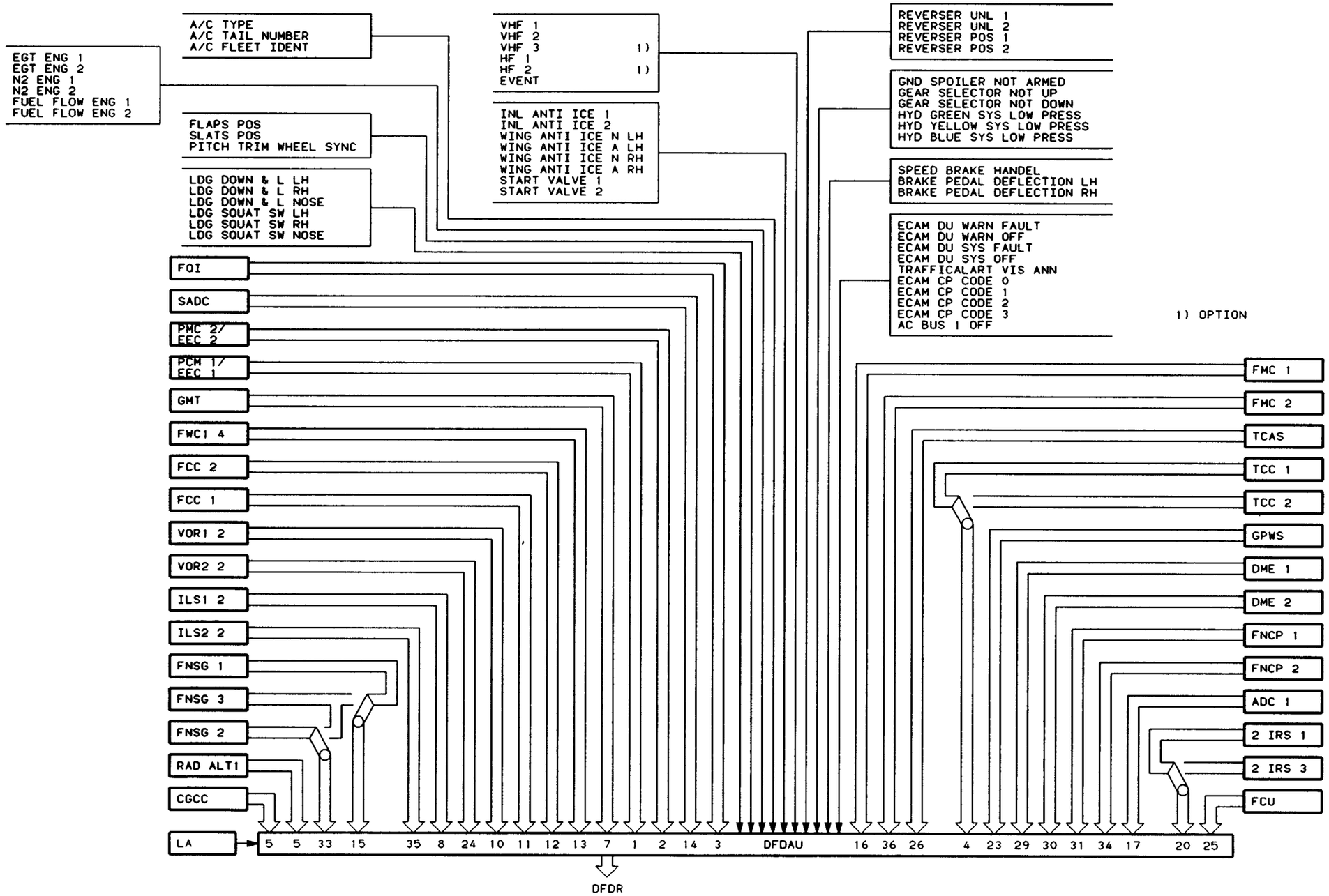
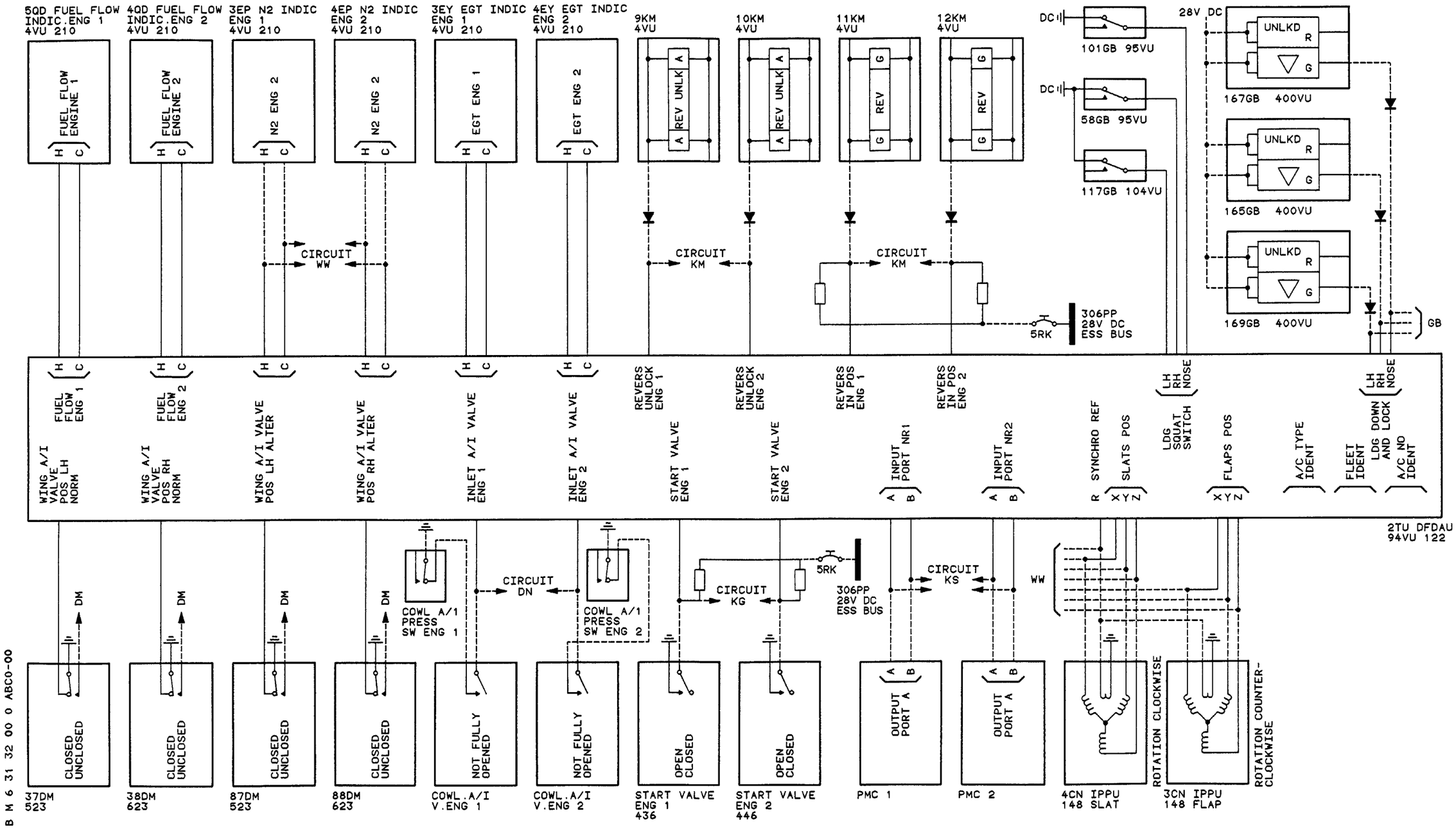
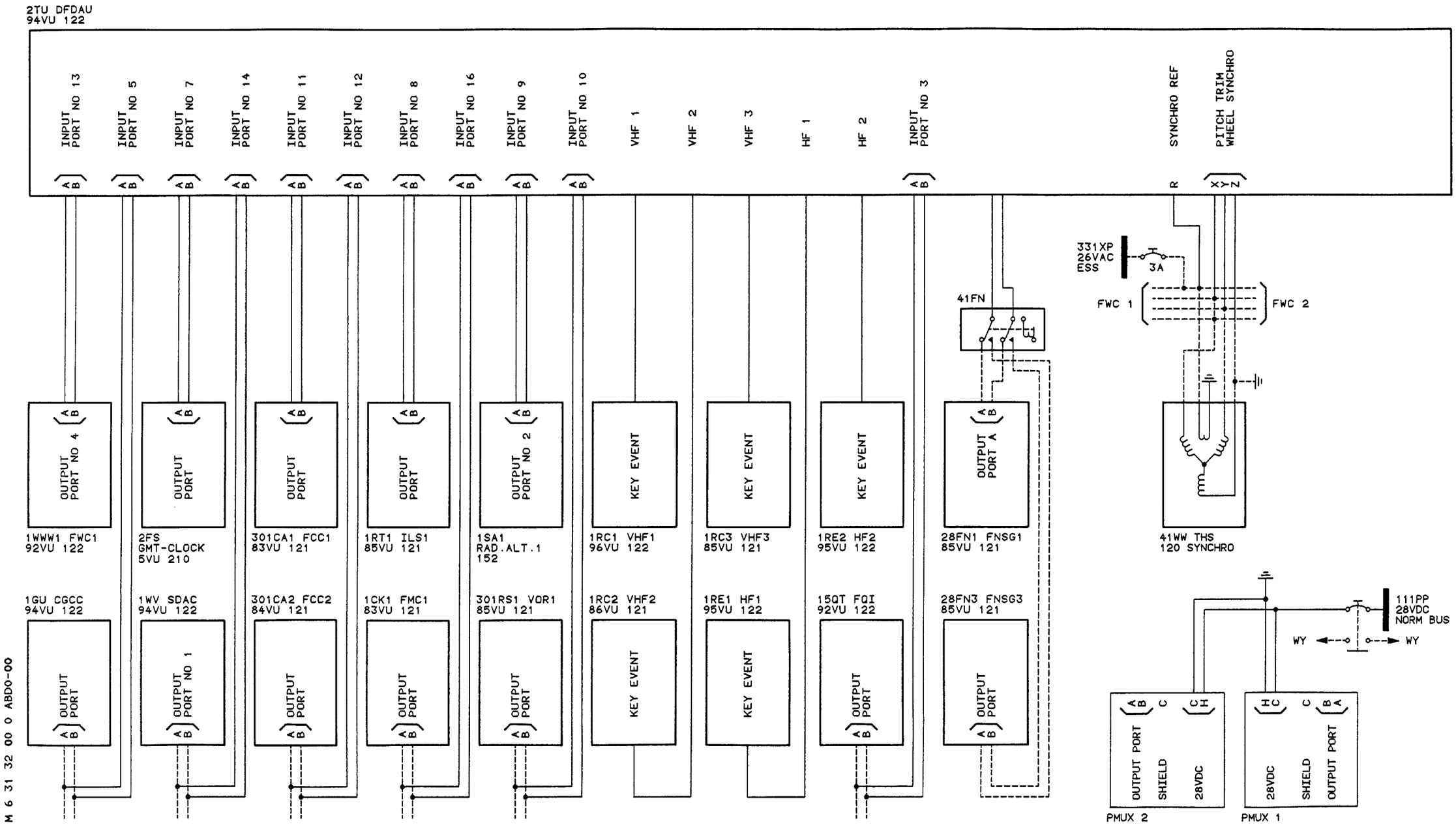


B M 6 31 32 00 0 AHD0 00

AIDS Parameter Sources Block Diagram
Figure 003

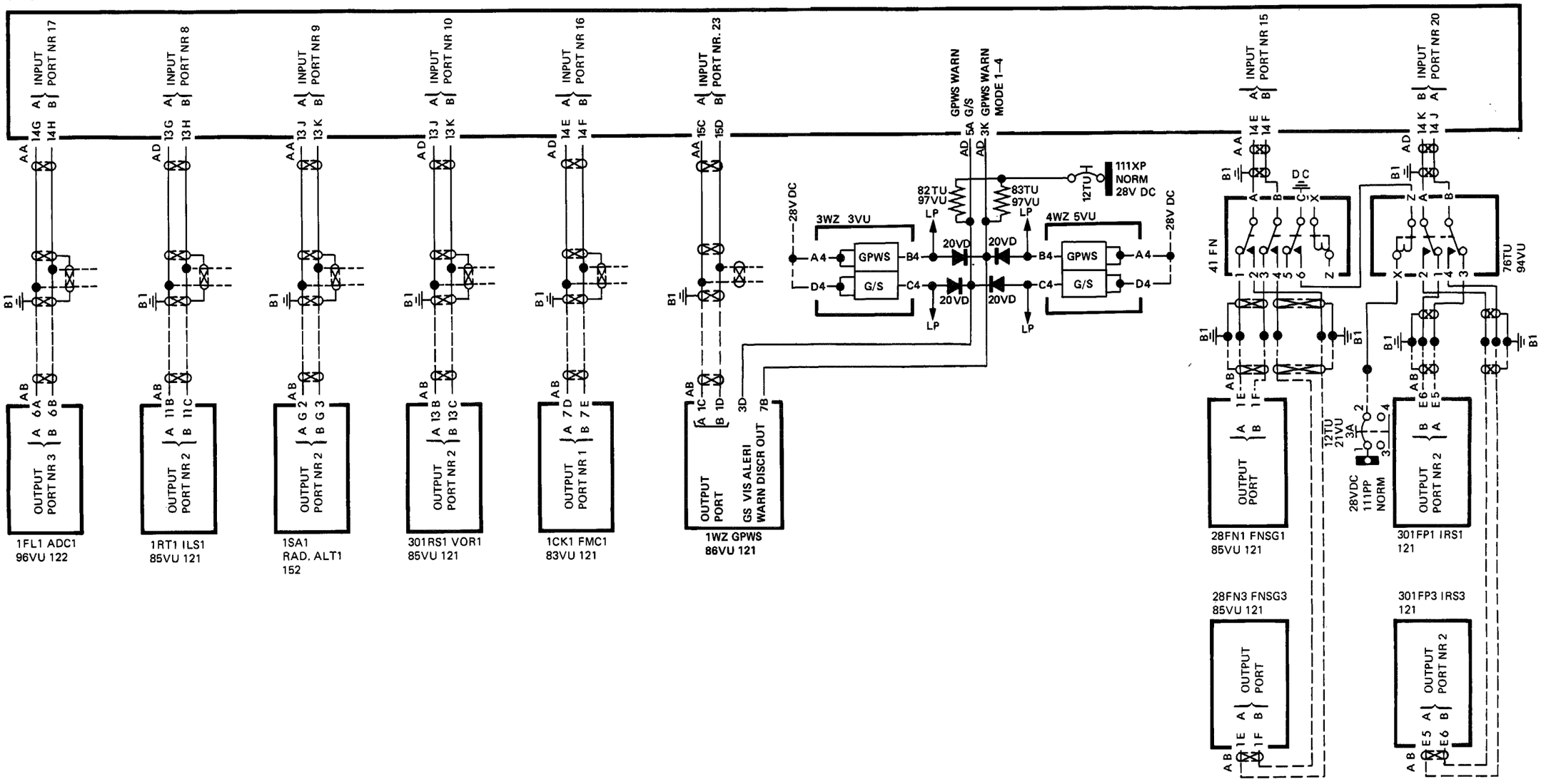


AIDS DFDAU Inputs
Figure 004



B M 6 31 32 00 0 ABD0-00

AIDS DFDAU Inputs
Figure 005



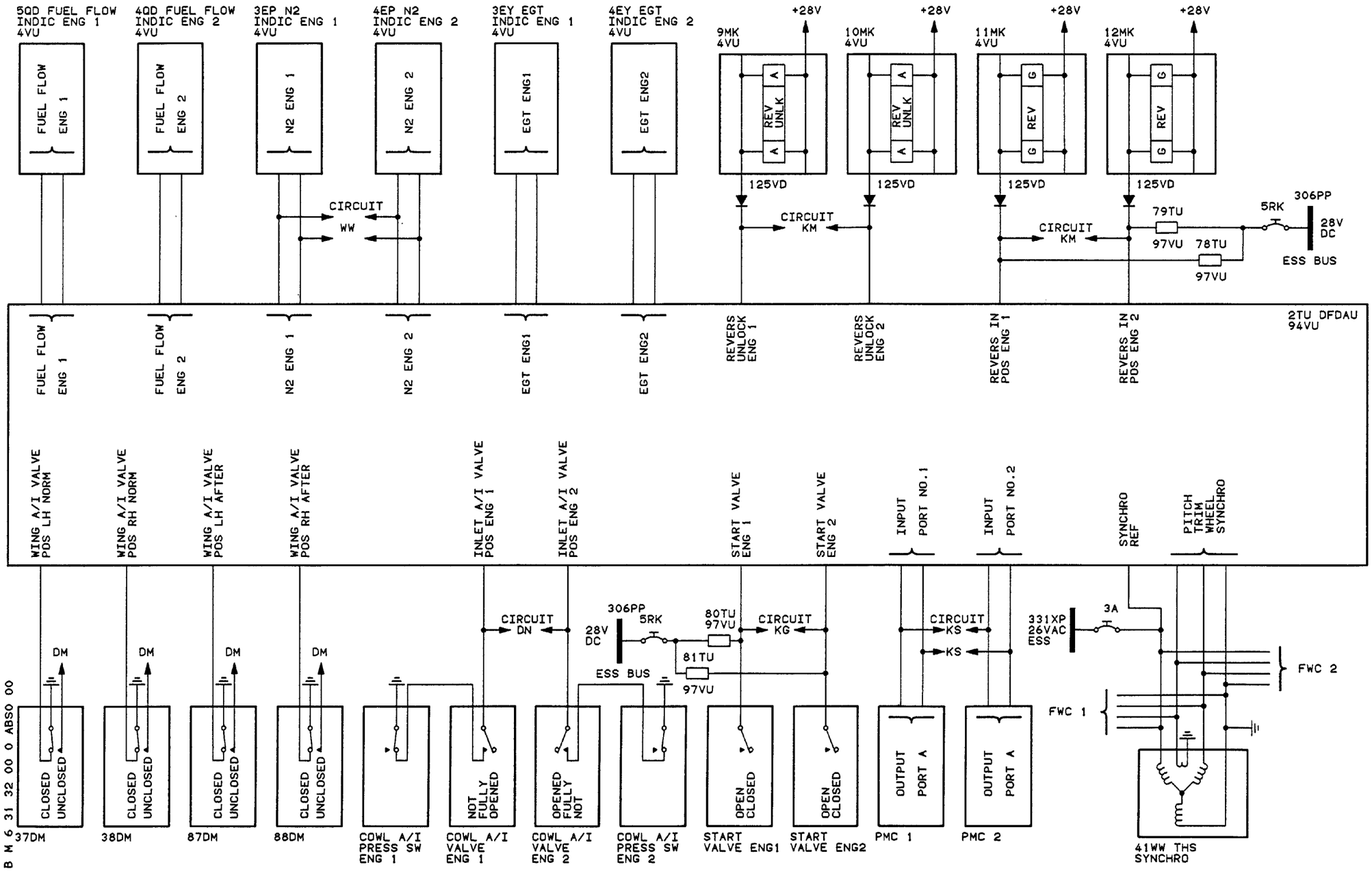
BM6 31 32 00 0AJE0-21

AIDS DFDAU Inputs
Figure 006

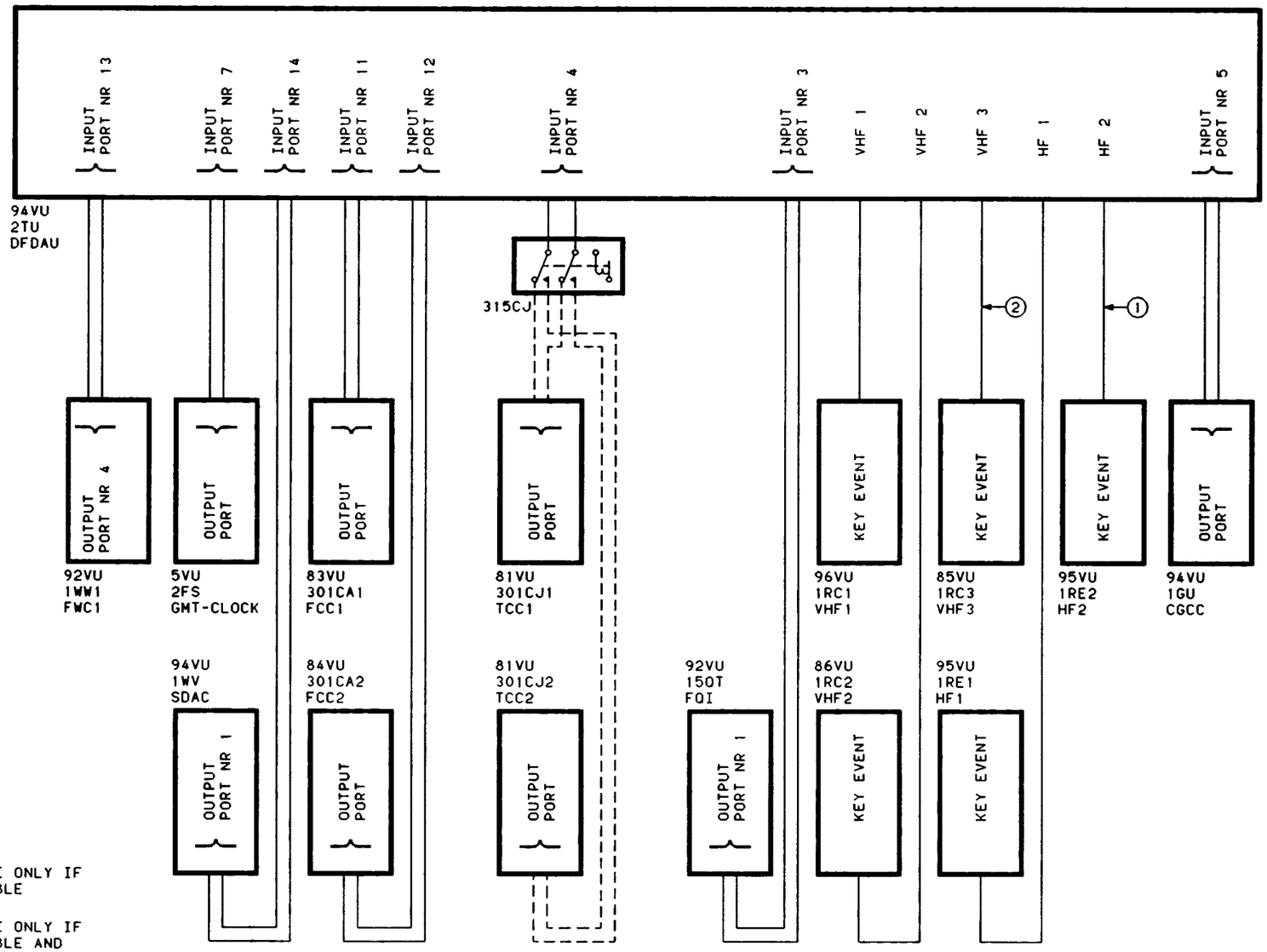
EFFECTIVITY: 001-100,

PIA

Printed in France



AIDS DFDAU Inputs
Figure 007



NOTE (1) INSTALLATION OF WIRE ONLY IF MOD 3205 IS APPLICABLE

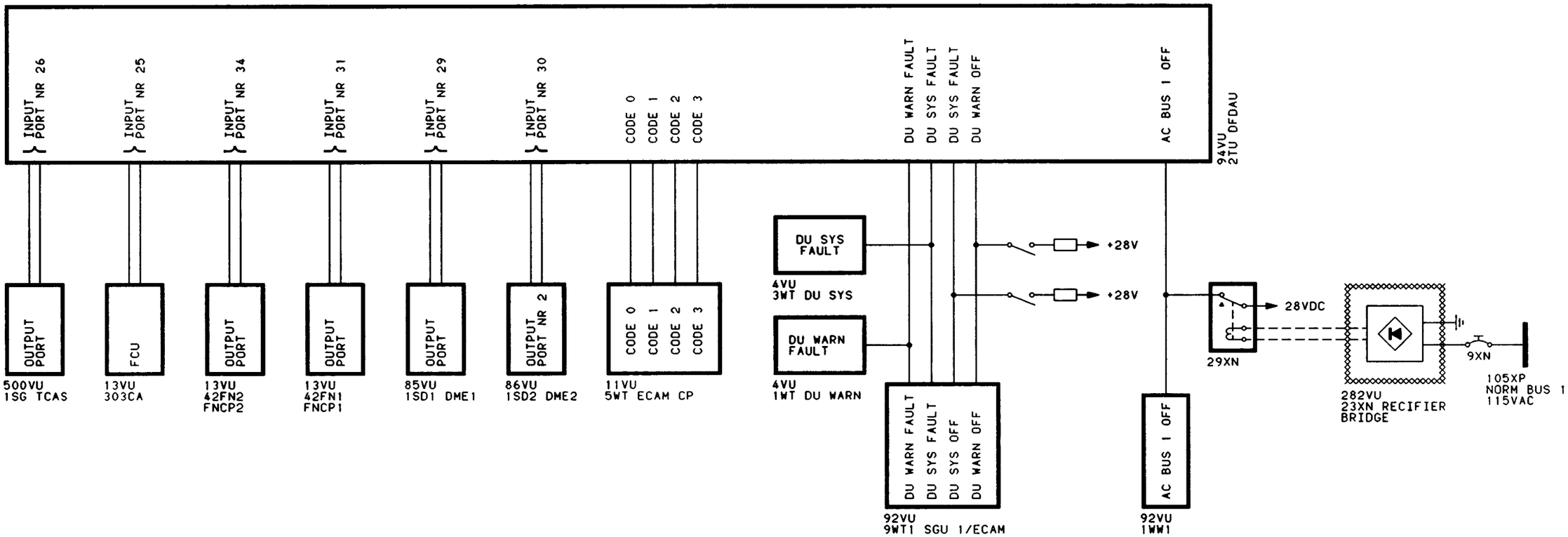
(2) INSTALLATION OF WIRE ONLY IF MOD 2951 IS APPLICABLE AND IF ACARS IS NOT INSTALLED

B M 6 31 32 00 0 AFD0 02

AIDS DFDAU Inputs
Figure 008

EFFECTIVITY: 004-100,

PIA

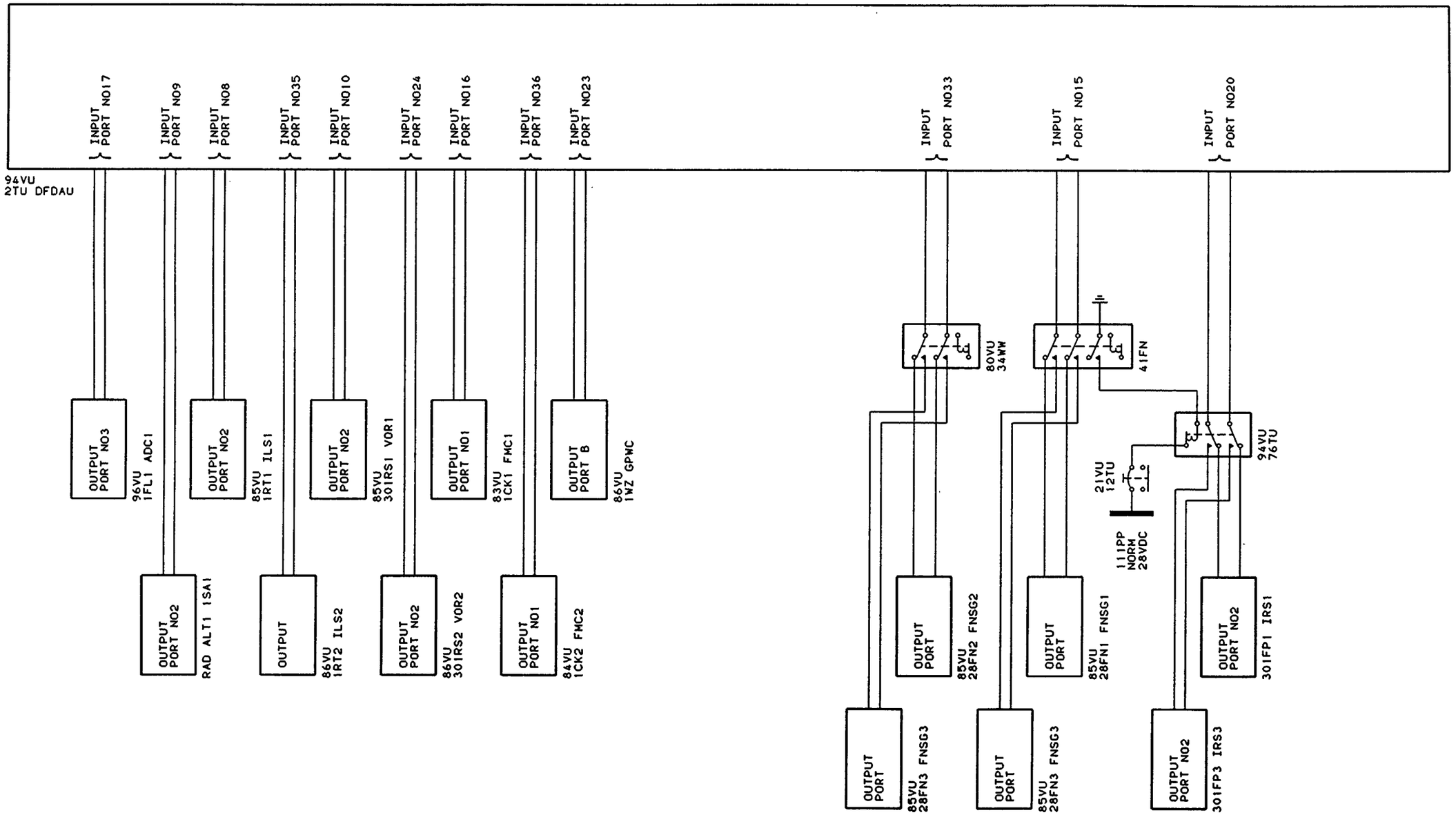


B M 6 31 32 00 0 AKC0 01

AIDS DFDAU Inputs
Figure 009

EFFECTIVITY: 004-100,

PIA

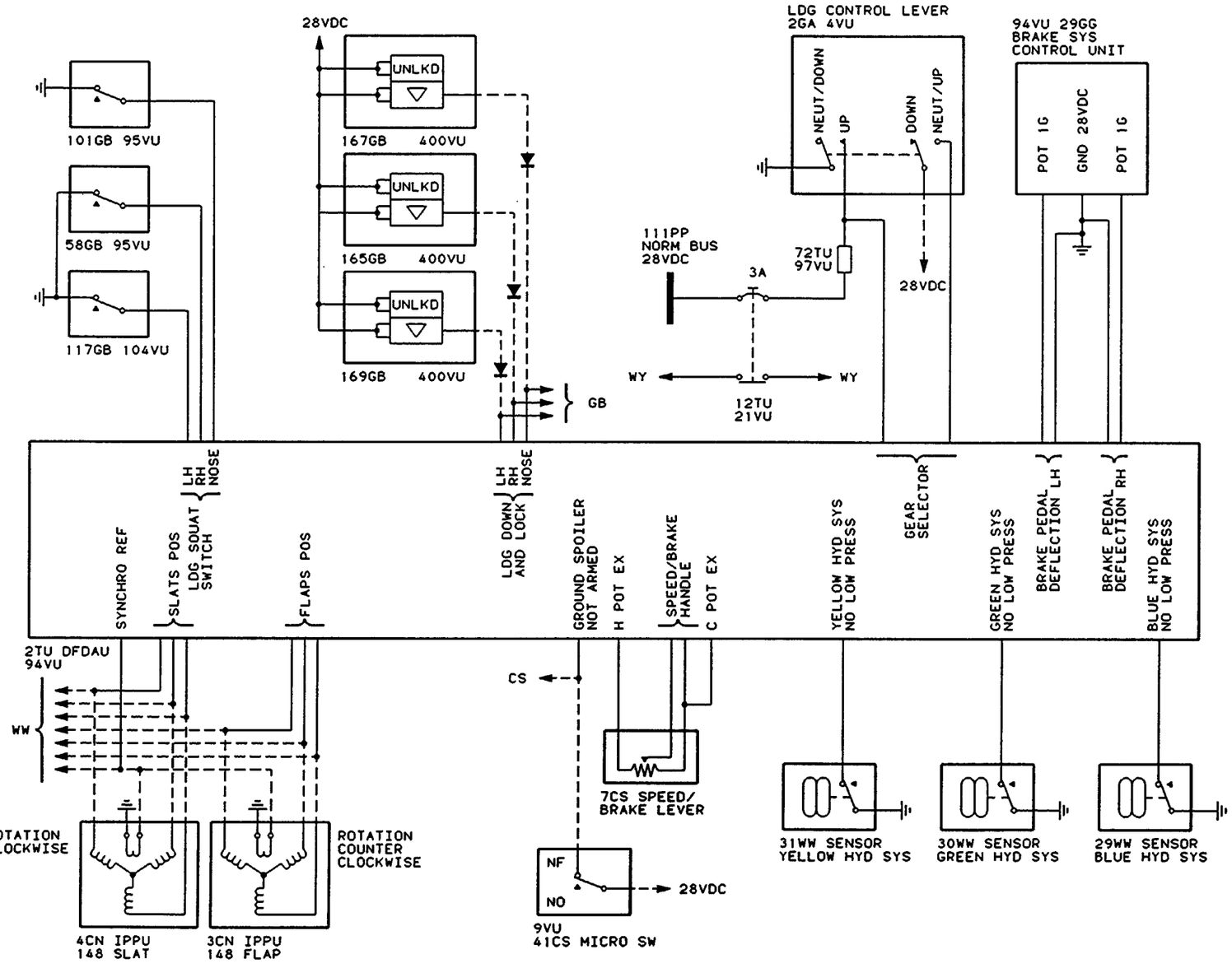


B M 6 31 32 00 0 AKE0 00

AIDS DFDAU Inputs
Figure 010

EFFECTIVITY: 004-100,

PIA



B M 6 31 32 00 0 AKF0 00

AIDS DFDAU Inputs
Figure 011

- nonlinear function (curves),
- varying accuracy,
- relationship between analog input value and source parameter value,
- special **ARINC 429** word occupation,
- special **DFDR** word slot occupation and
- status for discrete parameters.

For the detailed description of parameters see specific parameter description manual.

Parameter No: 1,2 **Name:** ALTITUDE (1013mb)

Signal Type: ARINC 429

Signal Characteristic:

Accuracy:	± 15 ft	below	0 ft
	± 20 ft	at	10.000 ft
	± 40 ft	at	30.000 ft
	± 80 ft	at	50.000 ft

* No. 2 ALTITUDE COARSE: WORD 23 Subframe 1,12 Bit

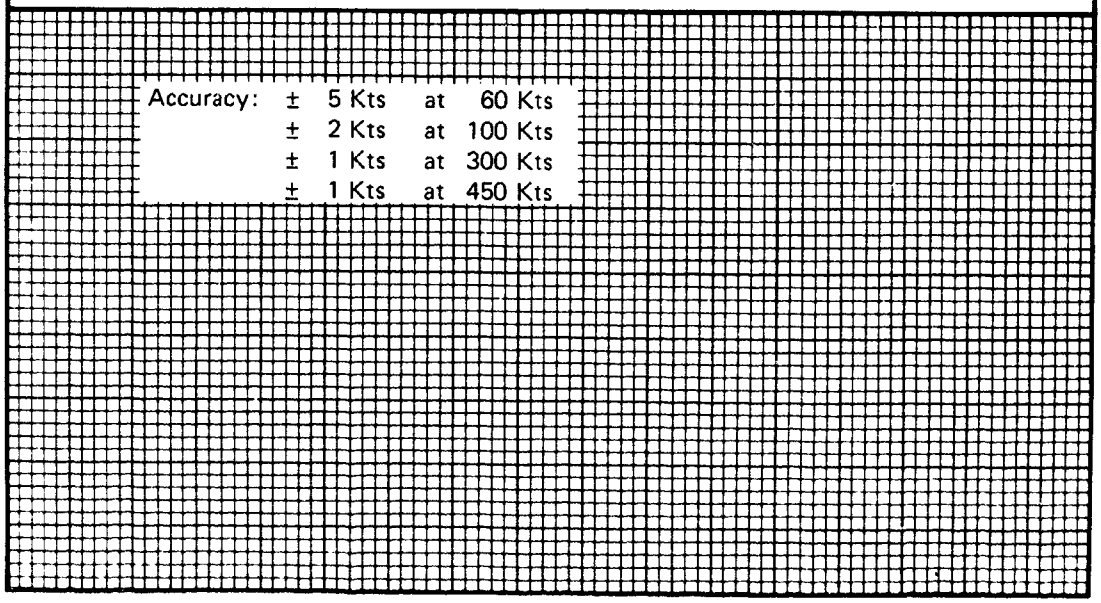
BM6 31320 0BA A0-12

Diagram
Figure 012

Parameter No: 4 Name: COMPUTED AIRSPEED

Signal Type: ARINC 429

Signal Characteristic:



BM6 31 32 00 0BA B 0-12

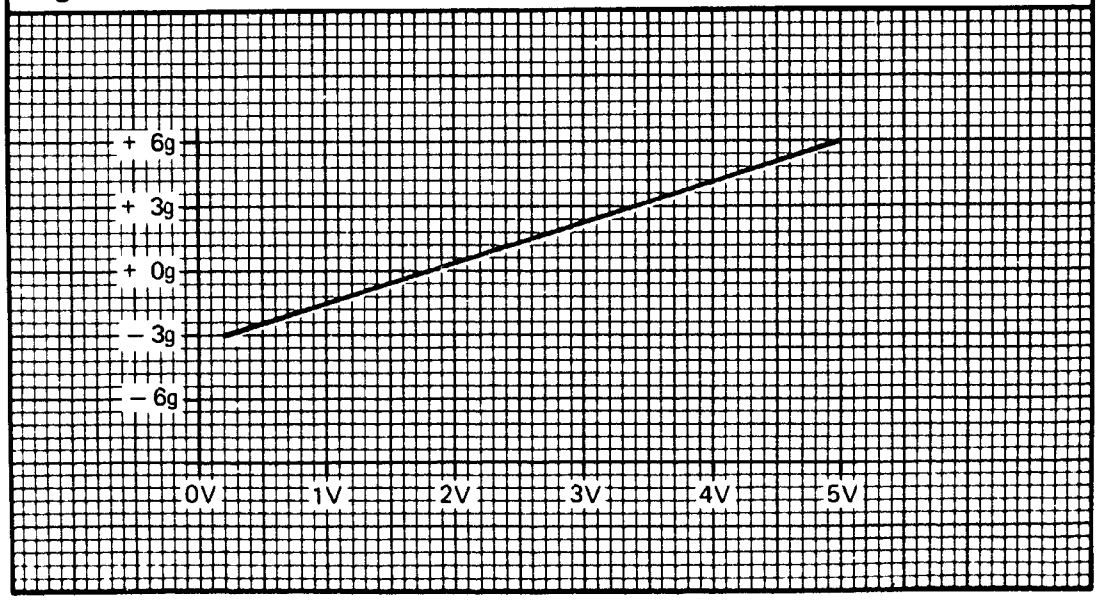
Diagram
Figure 013

Parameter No: 9 **Name:** BODY NORMAL ACCELERATION

Signal Type: LLDC 0-5V

Acceleration	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
—	0.000V	zero count	0	0	
– 3g	0.200V		41	164	
0g	1.800V		368	1474	
+ 1g	2.333V		478	1911	
+ 6g	5.000V	full count	1023	4095	

Signal Characteristic: Linear



BM6 31 32 00 0BAC0-12

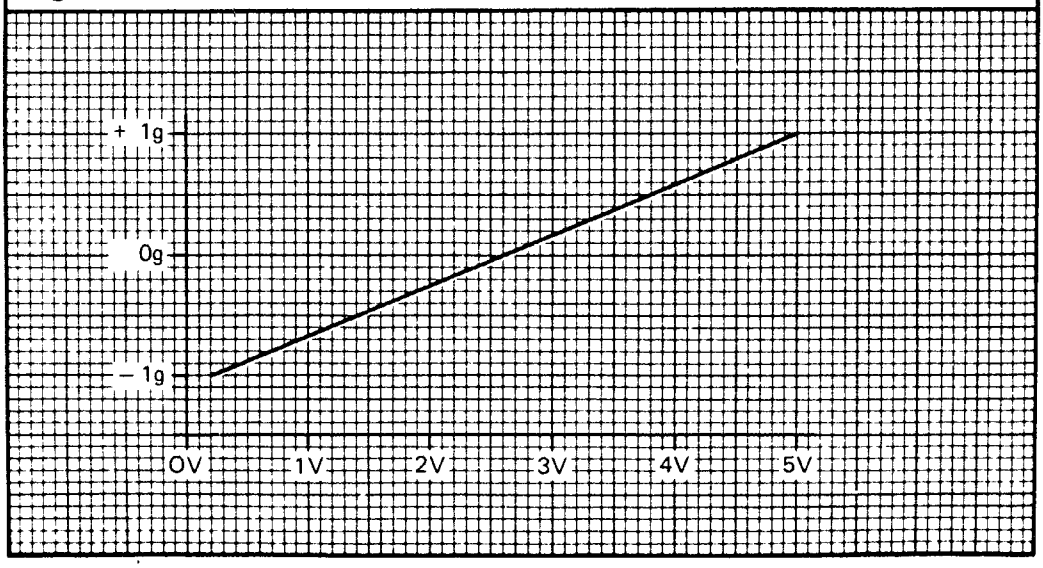
Diagram
Figure 014

Parameter No: 10 Name: BODY LATERAL ACCELERATION

Signal Type: LLDC 0-5V

Acceleration	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
—	0.000V	zero count	0	0	
– 1g	0.200V		41	164	
0g	2.600V		532	2129	
+ 1g	5.000V	full count	1023	4095	

Signal Characteristic: Linear



BM6 31 32 00 0BA D0-12

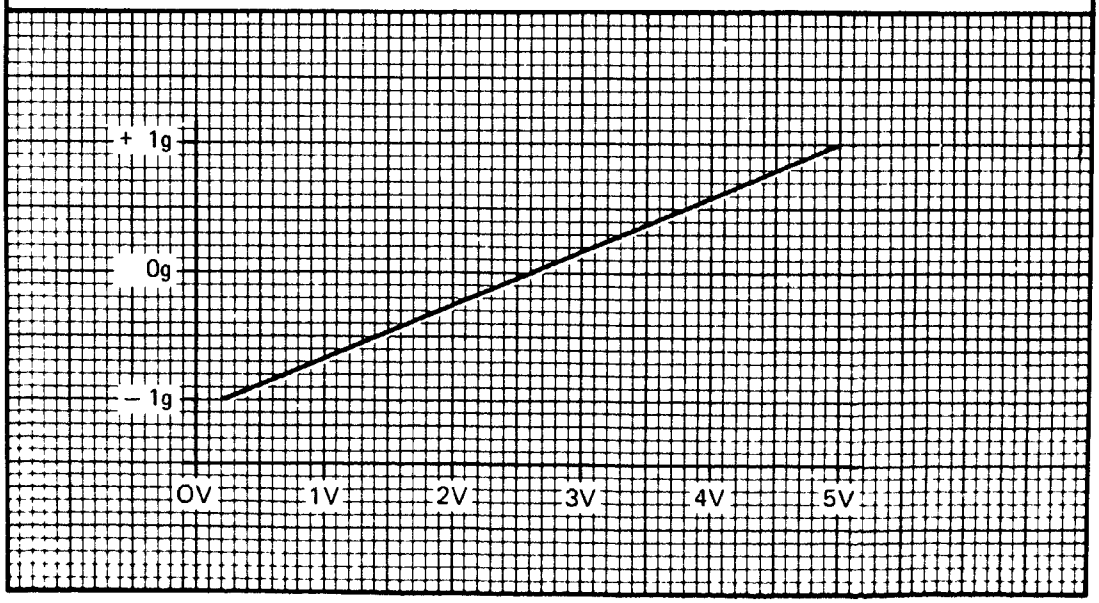
Diagram
Figure 015

Parameter No: 11 **Name:** BODY LONGITUDINAL ACCELERATION

Signal Type: LLDC 0-5V

Acceleration	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
	0.000V	zero count	0	0	
− 1g	0.200V		164	164	
0g	2.600V		2129	2129	
+ 1g	5.000V	full count	4095	4095	

Signal Characteristic: Linear



BM6 31320 0BA E 0-12

Diagram
Figure 016

Parameter No: 14 Name: GMT

Signal Type: ARINC 429

Signal Characteristic:

Data location on outputs ARINC 429 input and output

P	SSM	Data																	SDI	Label	
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8		1
X	X	X	MSC Tens hrs			Unit Hours				Tens Min.			Units Min				Min/10					0	0	125		

DFDR output

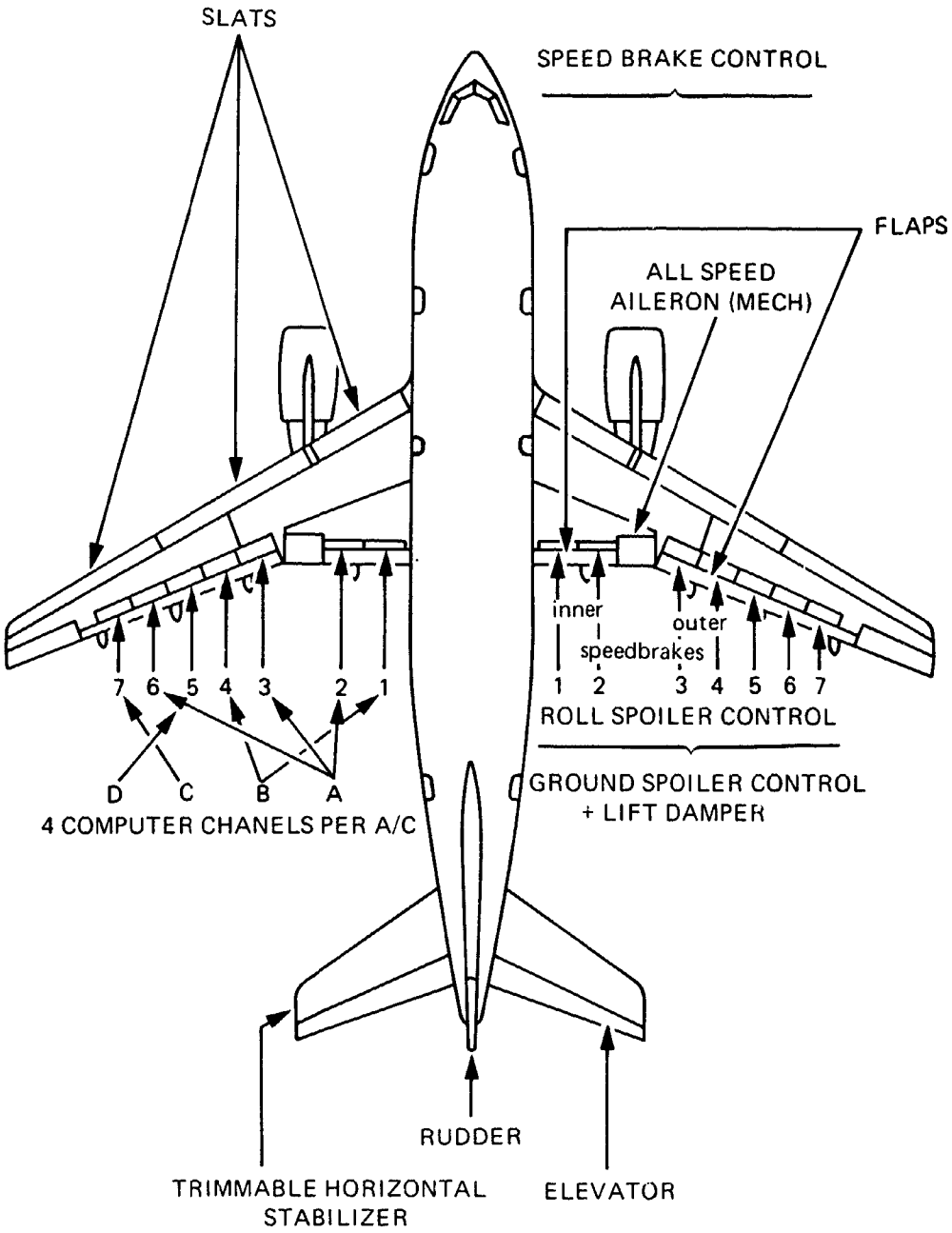
Word 37 Subframe 3	12	11	10	9	8	7	6	5	4	3	2	1	bit no.
	30	29—Tens Hours			—Units Hours				—Tens Min			—19	
Word 37 Subframe 1	12	11	10	9	8	7	6	5	4	3	2	1	bit no.
	22 —Tens Min				—Units Min				—Min/10			—11	

Reference to DITS bit no.

B M 6 31 32 00 0 BA F 0–12

Diagram
Figure 017

FLIGHT CONTROLS



B M G 31 32 00 0 BA G 0-12

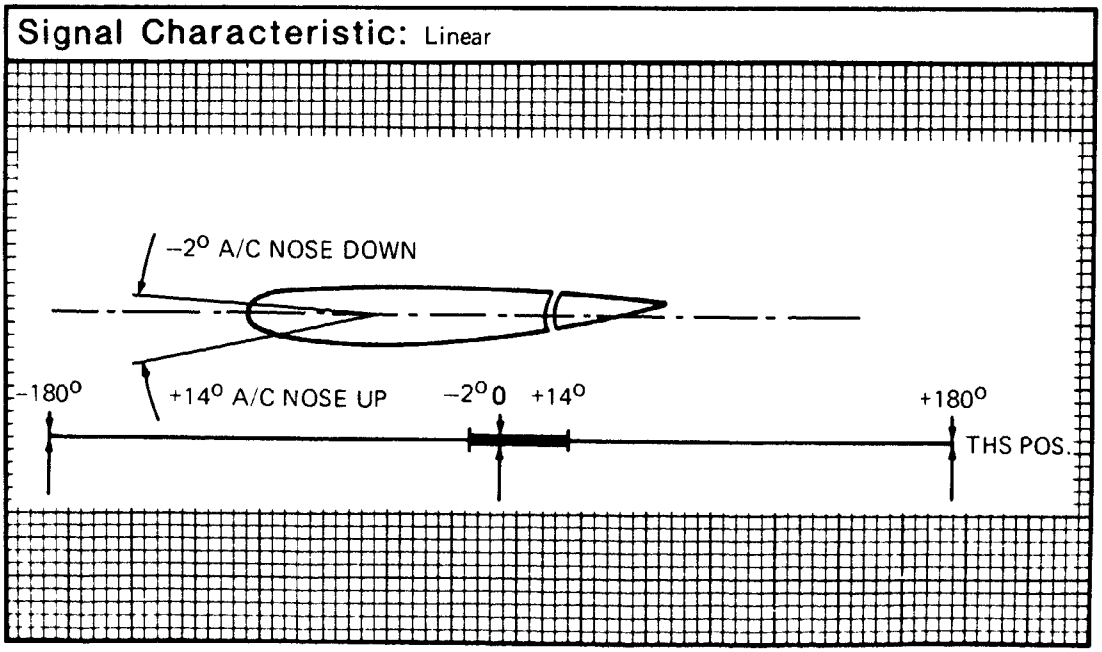
Flight Controls
Figure 018

Parameter No: 15 **Name:** STABILIZER POSITION

Signal Type: ARINC 429

Stabilizer position	DFDAU –input Dig. value –429	DFDR Dig. value	DFDAU output Dig. value –429		
-2^{o}	–2025	1018	–2025		
$+14^{o}$	+ 159	40	159		

Signal Characteristic: Linear



BM6 31 32 00 0BA H0-12

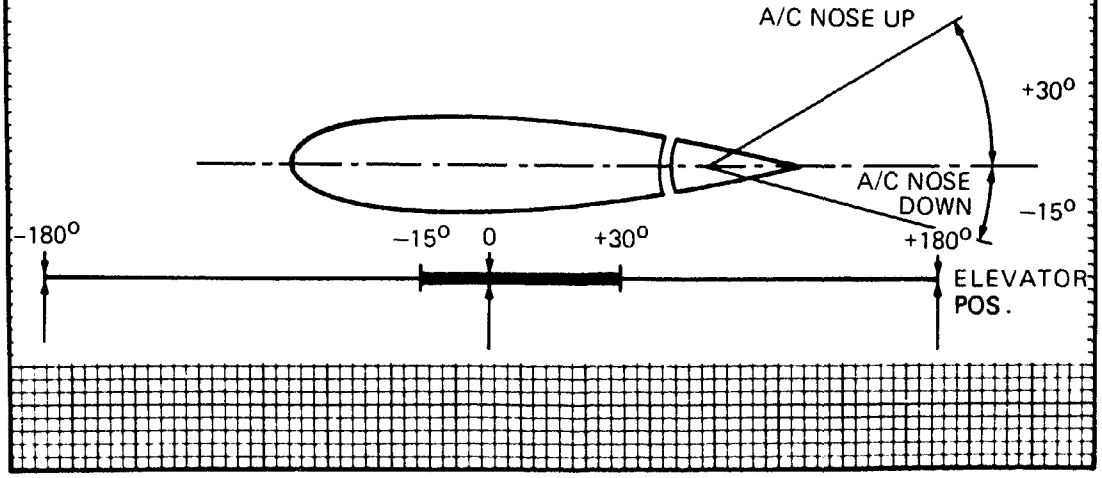
Diagram
Figure 019

Parameter No: 16 **Name:** ELEVATOR POSITION

Signal Type: ARINC 429

Elevator position	DFDAU input Dig. value –429	DFDR Dig. value	DFDAU output Dig. value –429		
–15Deg	–1877	981	–1877		
+ 30Deg	341	85	341		

Signal Characteristic: Linear



BM6 31 32 00 0BA J0–12

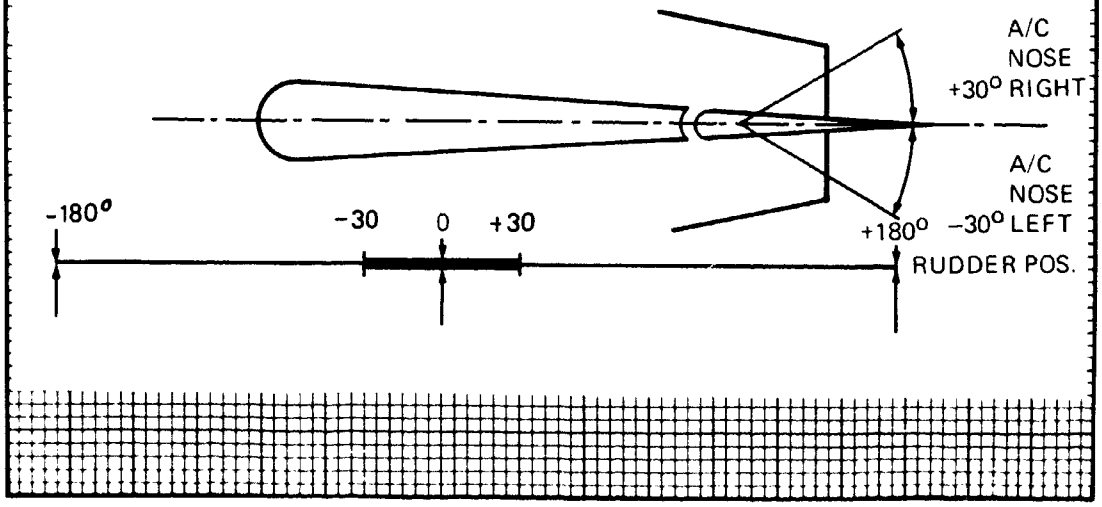
Diagram
Figure 020

Parameter No: 17 Name: RUDDER POSITION

Signal Type: ARINC 429

Rudder position	DFDAU –input Dig. value –429	DFDR Dig. value	DFDAU output Dig. value –429		
–30 Deg	–1707	939	–1707		
+ 30 Deg	341	85	341		

Signal Characteristic: Linear



BM6 31 32 00 0BA K0-12

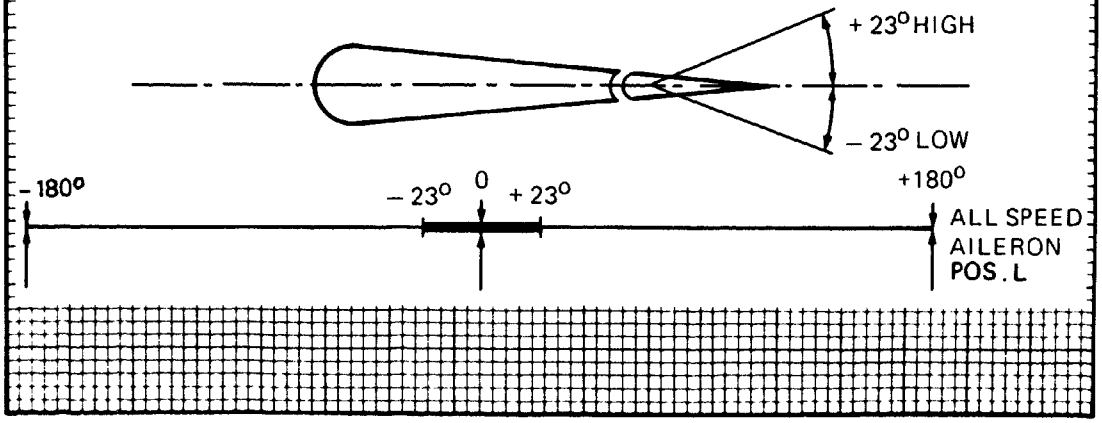
Diagram
Figure 021

Parameter No: 18 **Name:** ALL SPEED AILERON LH

Signal Type: ARINC 429

Aileron LH	DFDAU input Dig. value –429	DFDR Dig. value	DFDAU output Dig. value –429		
- 23 Deg	– 1786	959	–1786		
+ 23 Deg	262	65	262		

Signal Characteristic: Linear



BM6 31 32 00 0BAL0-12

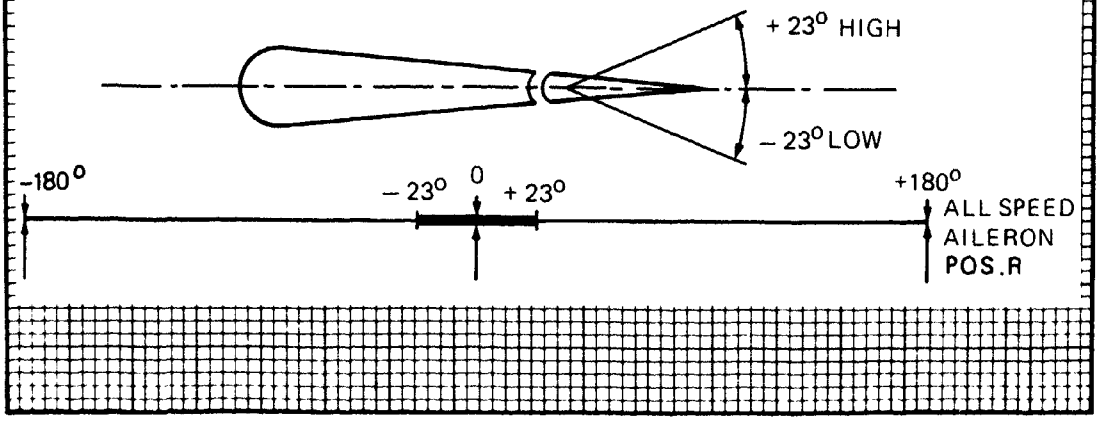
Diagram
Figure 022

Parameter No: 19 **Name:** ALL SPEED AILERON RH

Signal Type: ARINC 429

Aileron LH	DFDAU input Dig. value –429	DFDR Dig. value	DFDAU output Dig. value –429		
– 23 Deg	– 1786	959	– 1786		
+ 23 Deg	262	65	262		

Signal Characteristic: Linear



BM6 31320 0BA M0-12

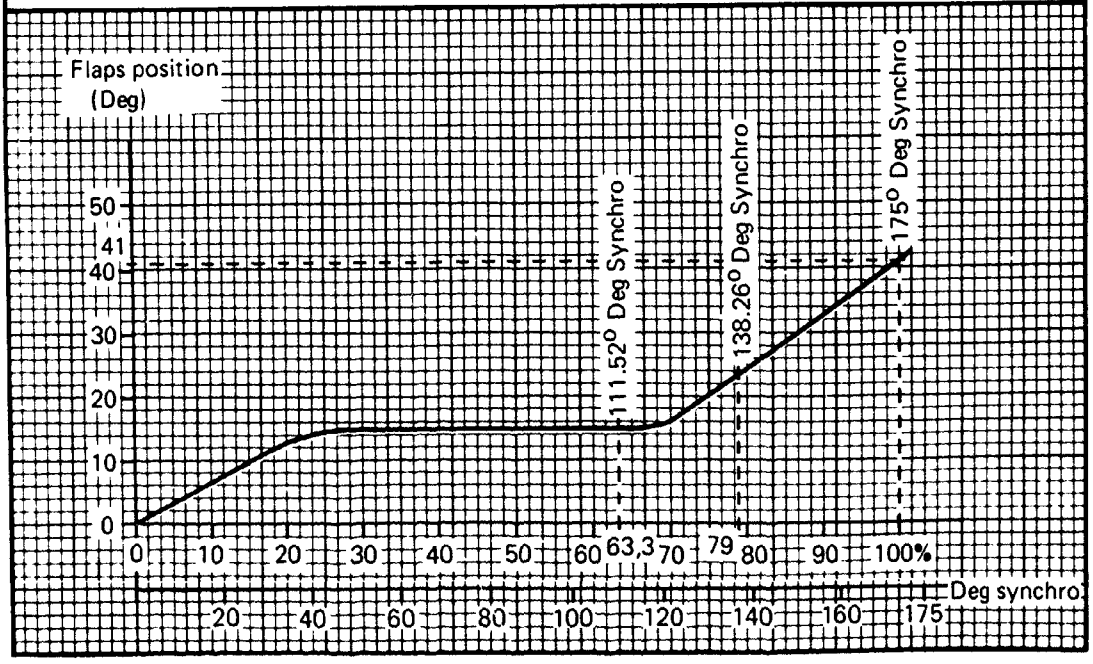
Diagram
Figure 023

Parameter No: 20 **Name:** FLAPS POSITION

Signal Type: SYNCHRO

Flaps	Synchro	Synchro travel	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429
0 Deg	0 Deg	0%	zero count	0	0
2.54 Deg	6.77 Deg	3.87%		20	77
6.47 Deg	14.35 Deg	8.20%		41	163
10.85 Deg	25.59 Deg	14.62%		73	291
12.61 Deg	31.87 Deg	18.21%		91	363
14.12 Deg	39.55 Deg	22.60%		112	450
15.02 Deg	51.65 Deg	29.51%		147	588
15.03 Deg	119.53 Deg	68.63%		340	1360
17.35 Deg	129.09 Deg	73.76%		367	1469
20.01 Deg	134.18 Deg	76.67%		382	1527
22.1 Deg	138.26 Deg	79.0%		393	1573
41.02 Deg	175.01 Deg	100%		498	1991
	360 Deg		full count	1023	4095

Signal Characteristic: See curve



BM6 31 32 00 0BA N0-12

Diagram
Figure 024

EFFECTIVITY: 001-100,

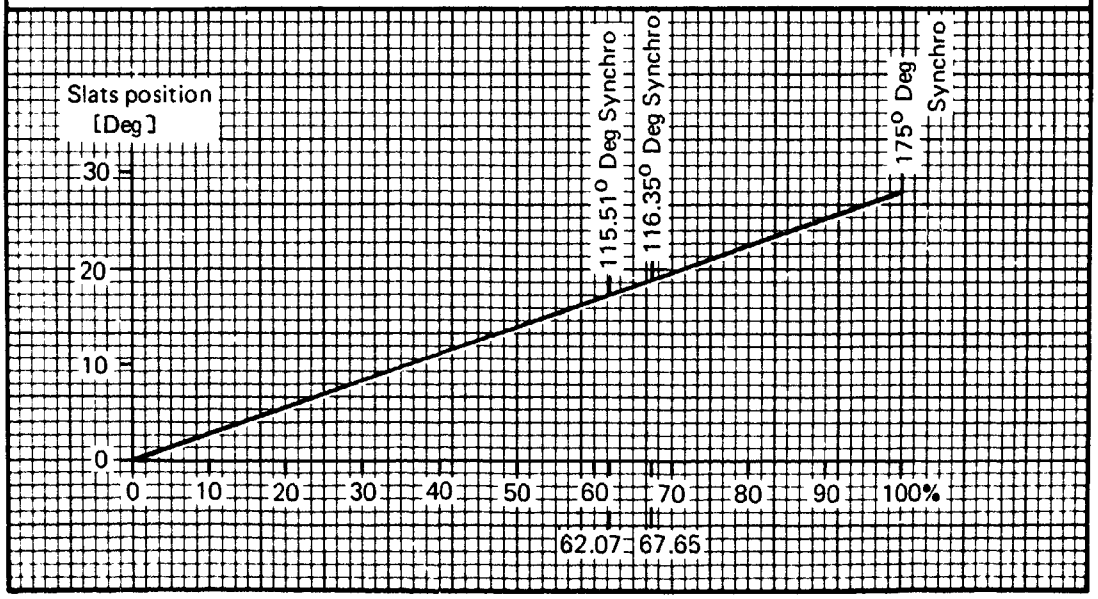
PIA

Parameter No: 21 **Name:** SLATS POSITION

Signal Type: SYNCHRO

Slats	Synchro	Synchro travel	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value – 429
0 Deg	0 Deg	0%	zero count	0	0
17 Deg	108.18 Deg	61.82%		308	1231
21 Deg	133.63 Deg	76.36%		380	1520
25.5 Deg	162.28 Deg	92.73%		462	1846
27.5 Deg	175 Deg	100%		498	1991
—	360 Deg	—	full count	1023	4095

Signal Characteristic: Linear



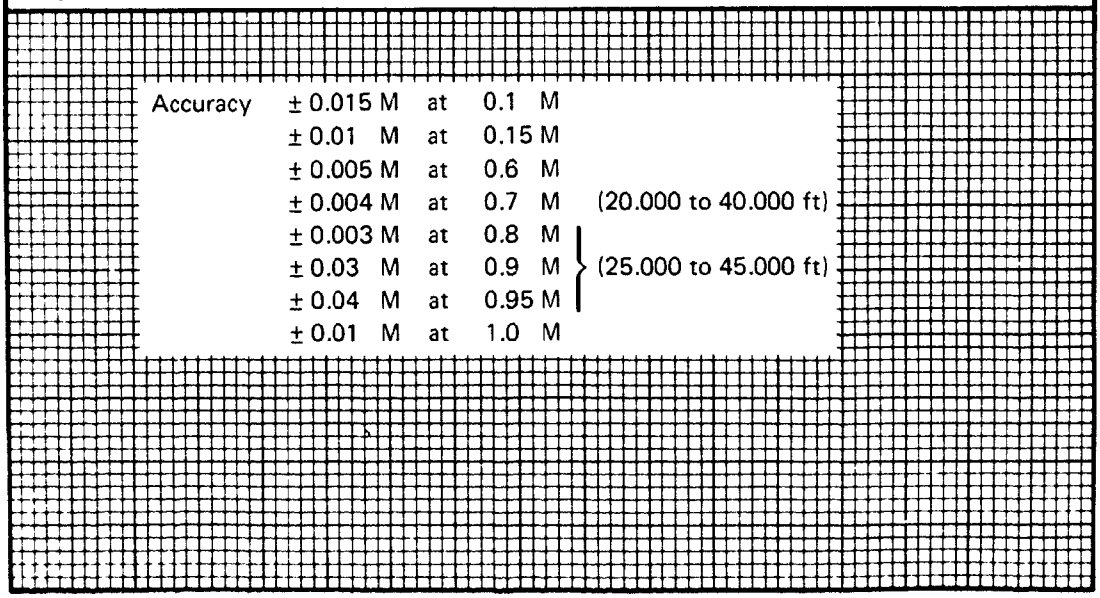
BM6 31 32 00 0BA P 0-12

Diagram
Figure 025

Parameter No: 100 Name: MACH

Signal Type: ARINC 429

Signal Characteristic:



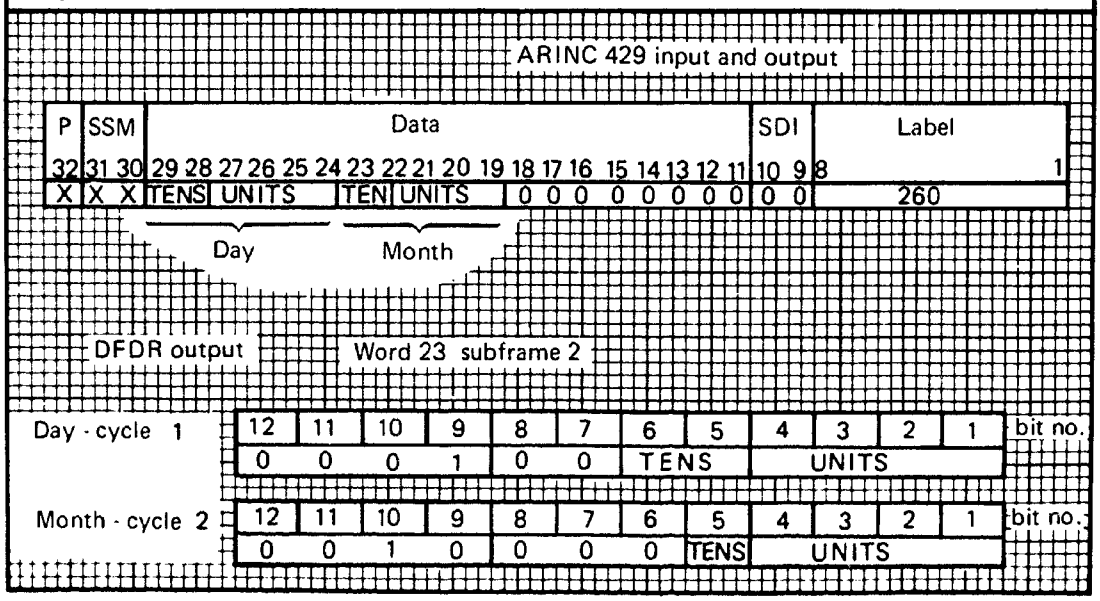
BM6 31 32 00 0BA 0 0-12

Diagram
Figure 026

Parameter No: 105 Name: DOC. DATA - DATE

Signal Type: ARINC 429

Signal Characteristic:


ARINC 429 input and output
P
SSM
Data
SDI
Label
32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 1
X X X TENS UNITS TEN UNITS 0 0 0 0 0 0 0 0 0 0 0 260
Day
Month
DFDR output
Word 23 subframe 2
Day - cycle 1
12 11 10 9 8 7 6 5 4 3 2 1 bit no.
0 0 0 1 0 0 TENS UNITS
Month - cycle 2
12 11 10 9 8 7 6 5 4 3 2 1 bit no.
0 0 1 0 0 0 0 TENS UNITS

BM6 31320 0BA R0-12

Diagram
Figure 027

Parameter No: 106 **Name:** DOC. DATA–FLIGHT No.

Signal Type: ARINC 429

Signal Characteristic:

ARINC 429 input and output

P	SSM	Data				SDI	Label
32	31 30	29 28 27	26 25 24	23 22 21 20	19 18 17 16 15 14 13 12 11	10 9	8 1
X	X X	THOUSANDS	HUNDREDS	TENS	UNITS 0 0 0	X X	261

FLIGHT No.

DFDR output

Word 23 subframe 2

	12	11	10	9	8	7	6	5	4	3	2	1	
Most Significant Digit – Cycle 3	0	0	1	1	THOUSANDS				HUNDREDS				bit no.
Least Significant Digit – Cycle 4	0	1	0	0	TENS				UNITS				bit no.

BM6 31 32 00 0BA T0-13

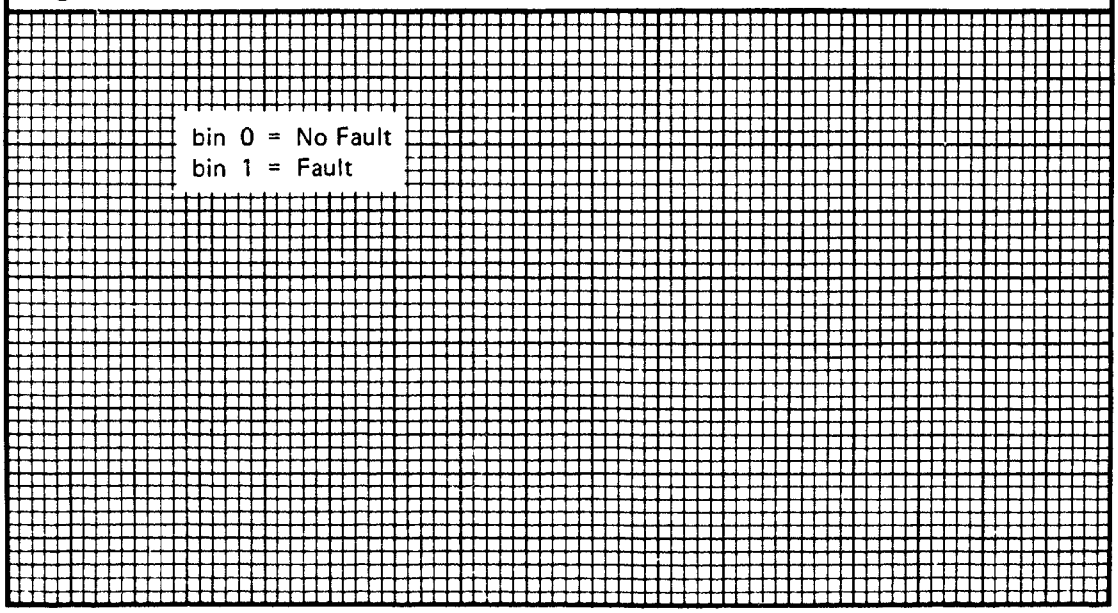
Diagram
Figure 028

Parameter No: 111 **Name:** BITE

Signal Type: 12 Discrete Bits

Bit no.	Interpretation
1	Power supply + CRU alarm
2	Coding alarm
3	CPU alarm
4	RAM/PROM alarm
5	DFDR alarm
6	PCM1 output alarm
7	IT 256 Hz (timer) alarm
8	CRU test alarm
9	DITS input alarm
10	Restart after cut–out < 200 ms
11	Discrete channels alarm
12	Documentary alarm.

Signal Characteristic:



BM6 31320 0BAU 0-12

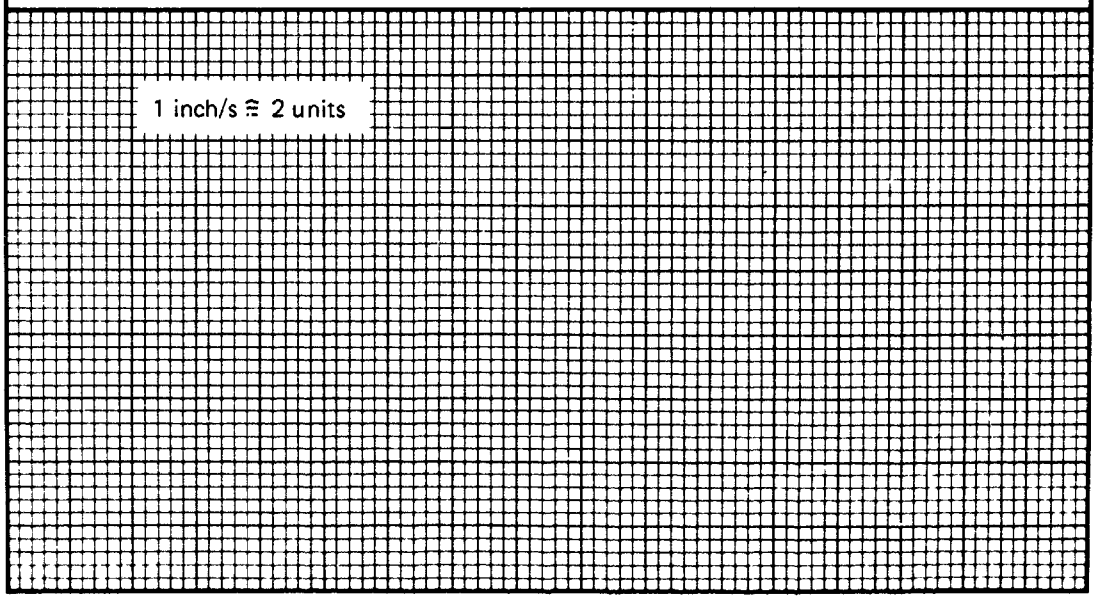
Diagram
Figure 029

Parameter No: 112 **Name:** EVM FAN ENG 1

Signal Type: ARINC 429

Vibration value	Dig. units - 429	DFDR Dig. value	Dig. value 429 outp.		
0 inch/s	0 units	0	0		
6.4 inch/s	12.8 units	1020	255		

Signal Characteristic: Linear



BM6 31 32 00 0BA W0-12

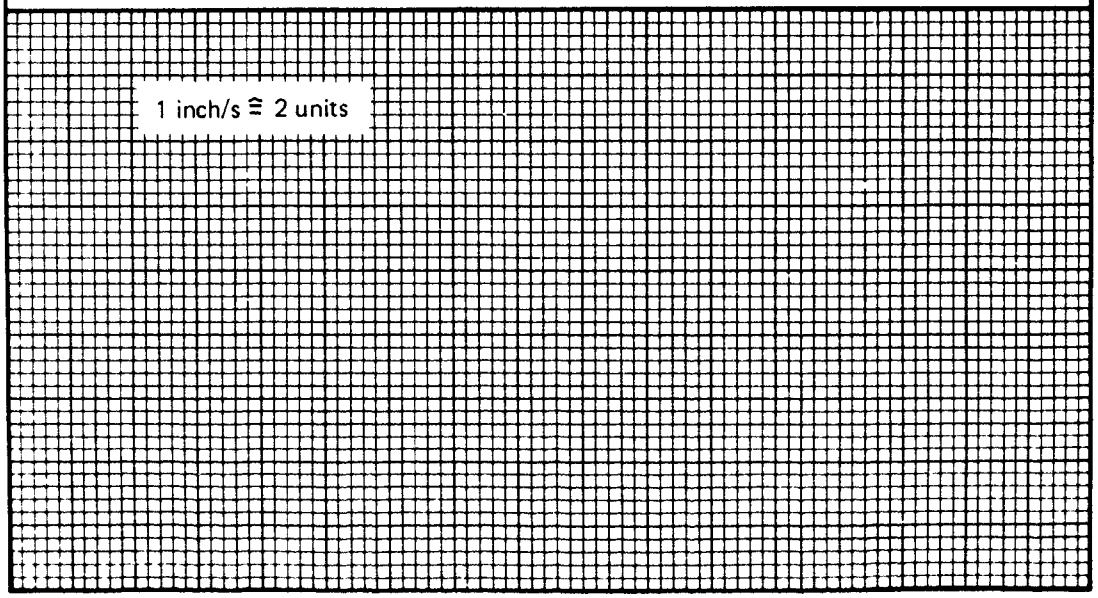
Diagram
Figure 030

Parameter No: 113 **Name:** EVM FAN ENG 2

Signal Type: ARINC 429

Vibration value	Dig. value 429	DFDR Dig. value	Dig. value 429 outp.		
0 inch/s	0 units	0	0		
6.4 inch/s	12.8 units	1020	255		

Signal Characteristic: Linear



BM6 31 32 00 0BA X 0-12

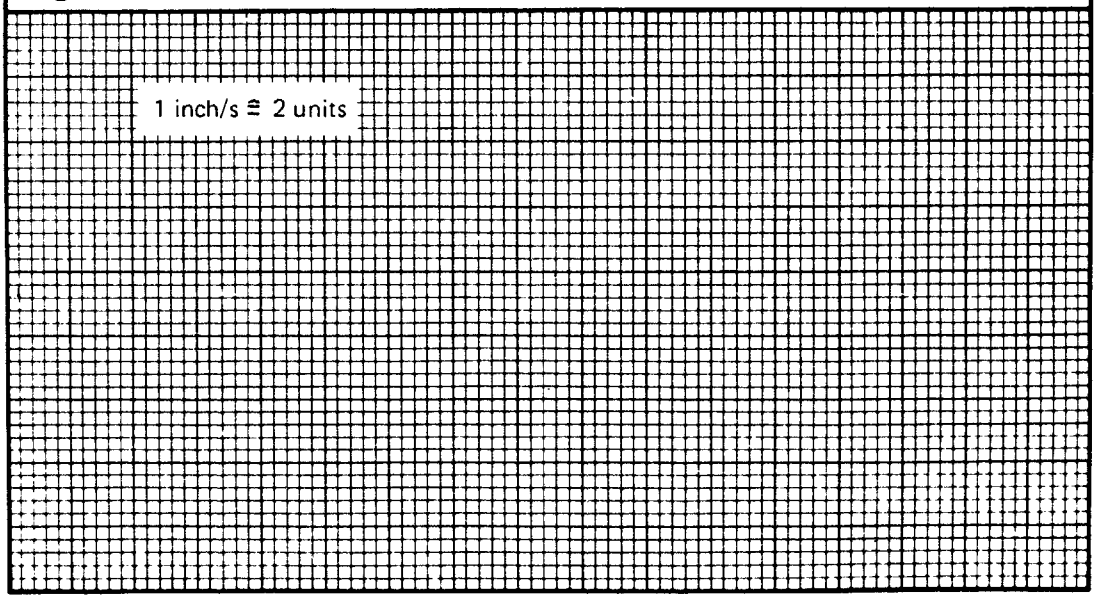
Diagram
Figure 031

Parameter No: 114 **Name:** EVM TURBINE ENG 1

Signal Type: ARINC 429

Vibration valve	Dig. units 429	DFDR Dig. value	Dig. value 429 outp.		
0 inch/s	0 units	0	0		
6.4 inch/s	12.8 units	1020	255		

Signal Characteristic: Linear



BM6 31320 0 BA Y 0–12

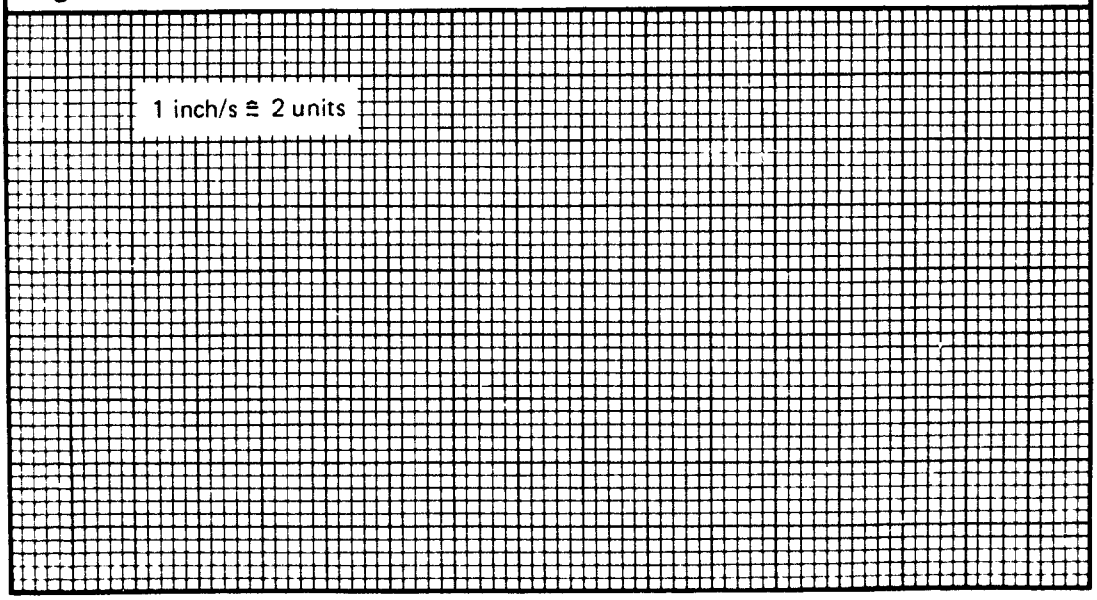
Diagram
Figure 032

Parameter No: 115 **Name:** EVM TURBINE ENG 2

Signal Type: ARINC 429

Vibration valve	Dig. units - 429	DFDR Dig. value	Dig. value 429 outp.		
0 inch/s	0 units	0	0		
6.4 inch/s	12.8 units	1020	255		

Signal Characteristic: Linear



BM6 31 32 00 0BA Z 0-12

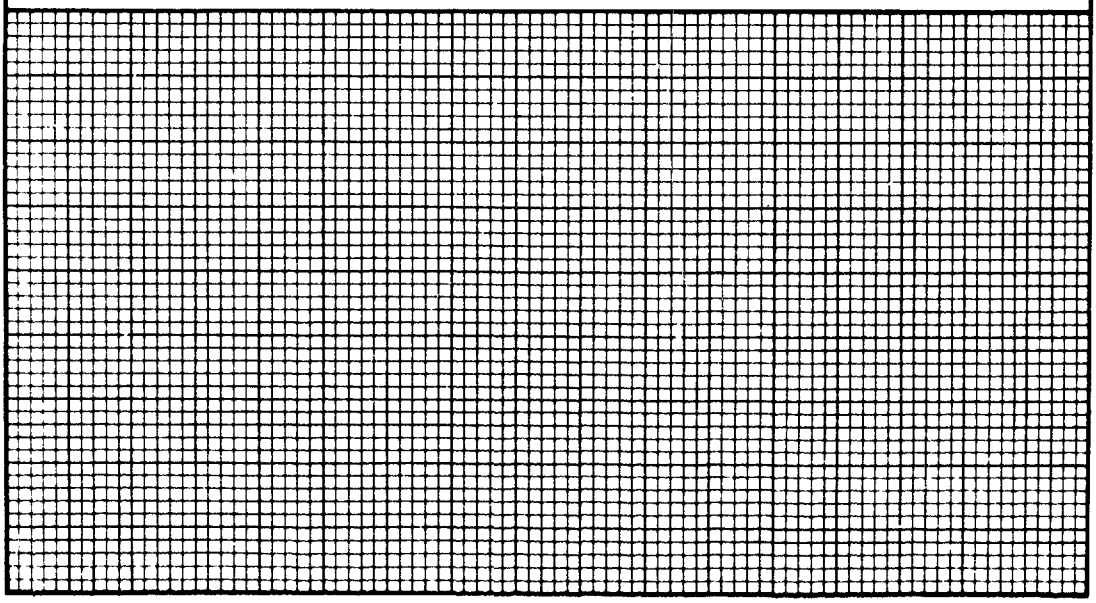
Diagram
Figure 033

Parameter No: 152 **Name:** N2 ENG 1 (GE)

Signal Type: LLDC 0-5V

N2	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
0% rpm	0V	zero count	0	0	
120% rpm	5V	full count	4095	4095	

Signal Characteristic: Linear



BM6 31320 0 88 A 0-12

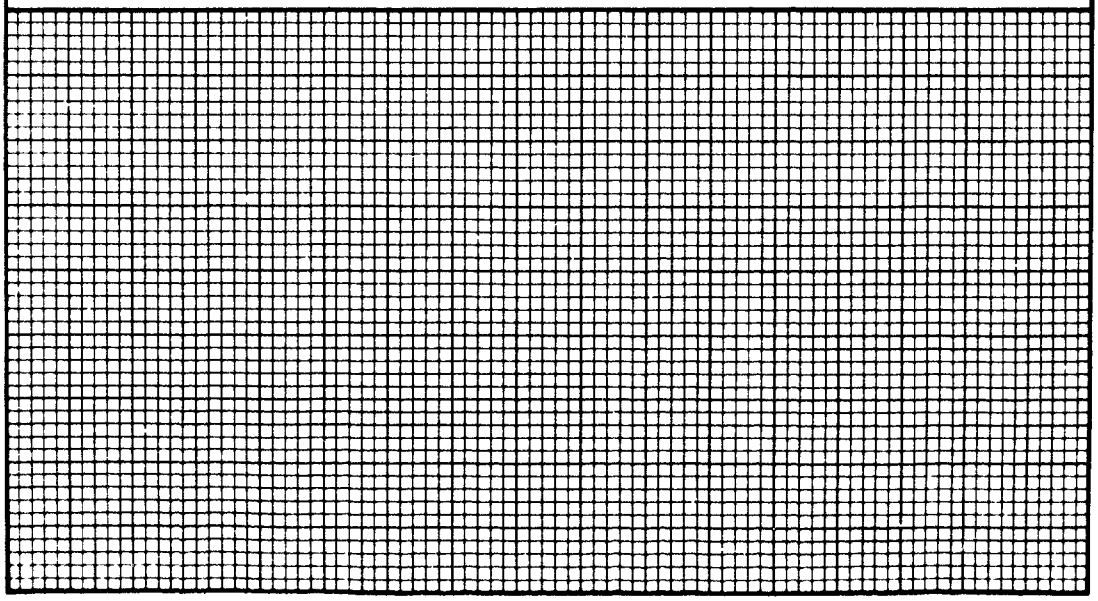
Diagram
Figure 034

Parameter No: 153 **Name:** N2 ENG 2 (GE)

Signal Type: LLDC 0-5V

N2	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
0% rpm	0V	zero count	0	0	
120% rpm	5V	full count	4095	4095	

Signal Characteristic: Linear



BM6 31 32 00 0 BB B 0-12

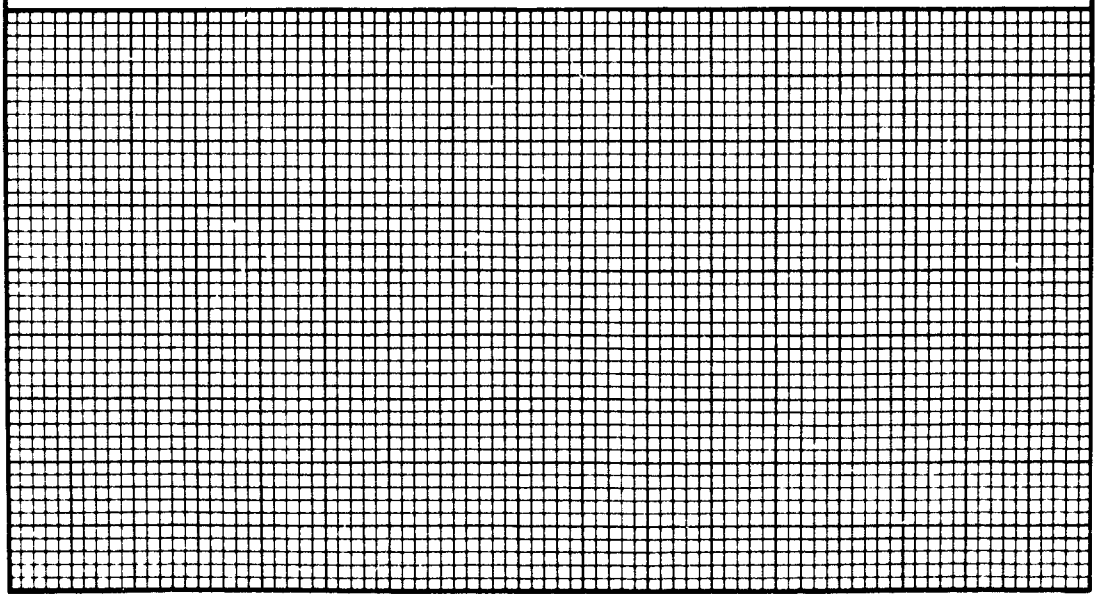
Diagram
Figure 035

Parameter No: 154 **Name:** EGT ENG 1 (GE)

Signal Type: LLDC 0-5V

EGT	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
0°C	0V	zero count	0	0	
1000°C	5V	full count	4095	4095	

Signal Characteristic: Linear



BM6 31 32 00 0BBC0-12

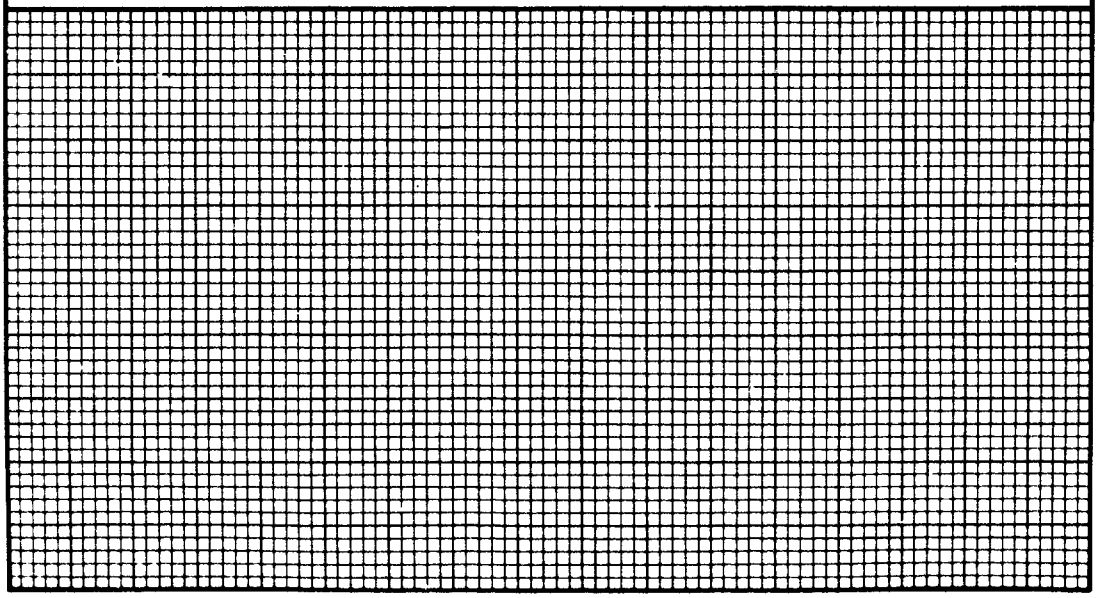
Diagram
Figure 036

Parameter No: 155 **Name:** EGT ENG 2 (GE)

Signal Type: LLDC 0-5V

EGT	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
0°C	0V	zero count	0	0	
1000°C	5V	full count	4095	4095	

Signal Characteristic: Linear



BM6 31 32 00 0BB D 0-12

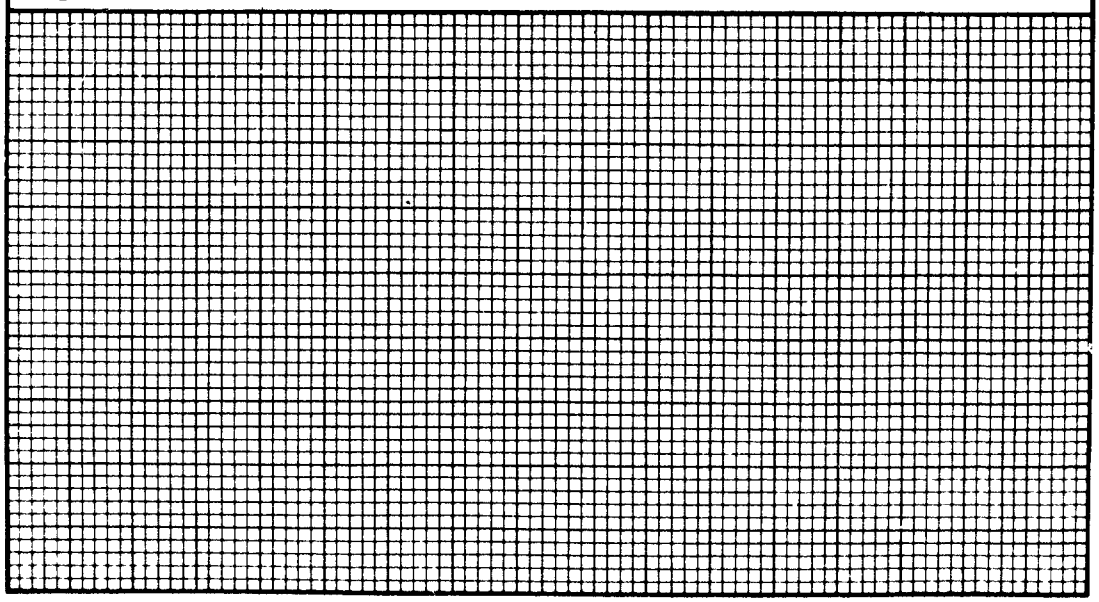
Diagram
Figure 037

Parameter No: 156 **Name:** FUEL FLOW ENG 1

Signal Type: LLDC 0-5V

Fuel Flow	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
0 kg/h	0V	zero count	0	0	
12500 kg/h	5V	full count	1023	4095	

Signal Characteristic: Linear



BM6 31320 0BB E 0-12

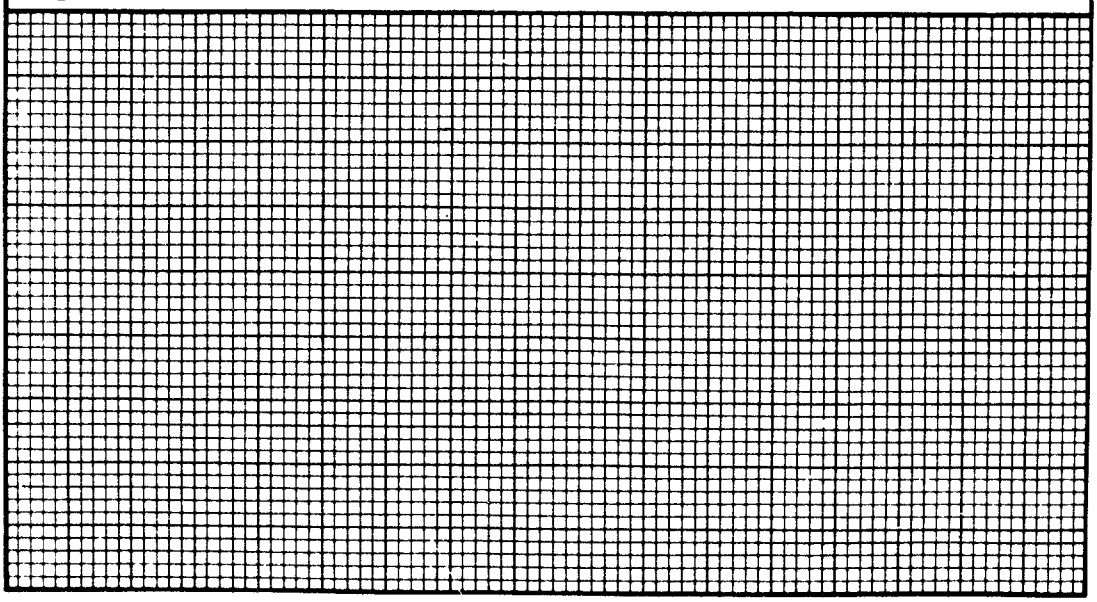
Diagram
Figure 038

Parameter No: 157 **Name:** FUEL FLOW ENG 2

Signal Type: LLDC 0-5V

Fuel Flow	Input voltage	AD Conversion count	DFDR Dig. value	DFDAU output Dig. value - 429	
0 kg/h	0V	zero count	0	0	
12500 kg/h	5V	full count	1023	4095	

Signal Characteristic:



BM6 31320 0B8 F0-12

Diagram
Figure 039

Parameter No: 166 **Name:** DATA BASE UPDATE

Signal Type: ARINC 429

Signal Characteristic:

P	SSM	Data																SDI	Label
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	1
			Days						Month				Cycle											263	
			x10			x1			x10			x1		x1											

Bit 18
1 → current cycle: From 27.07 to 23.08
0 → previous cycle: From 29.06 to 26.07

SSM 0,0 Data base identified
0,1 (NCD) No ata base available

DFDR output — Word 54 subframe 4

12	11	10	9	8	7	6	5	4	3	2	1
Days						Month					Cycle
x10			x1			x10		x1			x1

BM6 31 32 00 0BB G 0-12

Diagram
Figure 040

EFFECTIVITY: 001-100,

PIA

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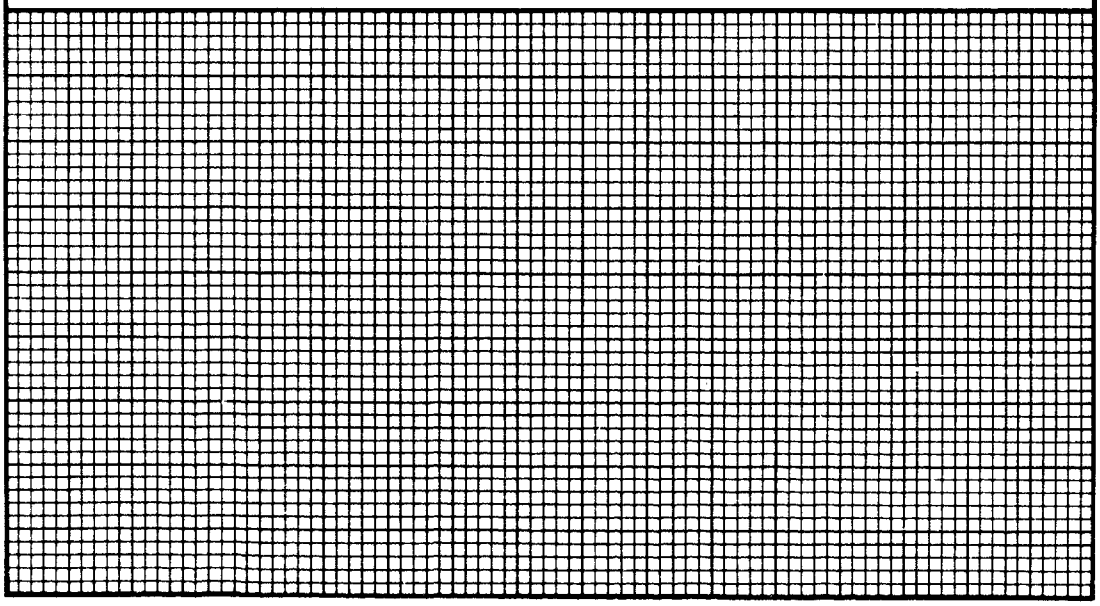
Parameter No: 269 **Name:** FLAPS LEVER POSITION

Signal Type: ARINC 429

Lever position	Nominal Flaps position	Real Flaps position	Flaps Synchro %	ARINC 429 Bit No.	
Position 1	0 Deg	0 Deg	0%	11	
Position 2	0 Deg	0 Deg	0%	12	
Position 3	15 Deg	15.03 Deg	68.3%	13	
Position 4	20 Deg	22.1 Deg	79%	14	
Position 5	40 Deg	41.02 Deg	100%	15	

Signal Characteristic:



BM6 31 32 00 0BBJ0-12

Diagram
Figure 041

No	Parameter	bin	Status
22	SLATS FAULT/OFF	0	slats good and engaged or inhibitted
		1	slats fail or off (system 1 and 2)
23	FLAPS FAULT/OFF	0	flaps good and engaged or inhibitted
		1	flaps fail or off (system 1 and 2)
24	REVERSER UNLOCK ENG 1	0	unlock
		1	locked
25	REVERSER IN POSITION ENG 1	0	in position
		1	not in position
26	REVERSER UNLOCK ENG 2	0	unlock
		1	locked
27	REVERSER IN POSITION ENG 2	0	in position
		1	not in position
32	A/P CMD#1	0	not CMD mode
		1	CMD mode
33	A/P CWS# 1	0	not CWS mode
		1	CWS mode
34	LAND TRACK# 1	0	not LAND TRACK phase
		1	LAND TRACK phase
35	A/P CMD# 2	0	not CMD mode
		1	CMD mode
36	A/P CWS# 2	0	not CWS mode
		1	CWS mode
37	LAND TRACK# 2	0	not LAND TRACK phase
		1	LAND TRACK phase
38	VHF 1	0	in send mode
		1	not in send mode
39	VHF 2	0	in send mode
		1	not in send mode
40	OUTER MARKER	0	no marker
		1	marker [400 Hz]
41	MIDDLE MARKER	0	no marker
		1	marker [1300 Hz]

BM6 31 32 00 0 BD V 0-12

Diagram
Figure 042

No	Parameter	bin	Status
42	INNER MARKER	0	no marker
		1	marker [3000 Hz]
43	VHF 3	0	in send mode
		1	not in send mode
44	HF 1	0	in send mode
		1	not in send mode
45	HF 2 (not inst. for SR 1)	0	in send mode
		1	not in send mode

No	Parameter	bin	Status
103	VMO/MMO	0	no VMO/MMO warning
		1	VMO/MMO warning
104	EVENT	0	not pushed EVENT button
		1	pushed EVENT button
108	A/C TYPE (6 discr.)	0	open pin
		1	connected to common OV - RTP 11K
109	A/C TAIL NUMBER (8 dis.)	0	open pin
		1	connected to common OV - RTP 11K
110	FLEET IDENTIFICATION (4 dis.)	0	open pin
		1	connected to common OV - RTP 11K
111	BITE (12 discr.)	0	good
		1	fail
116	SPOILER LH 1 RET	0	spoiler 1 lh extended
		1	spoiler 1 lh retracted
117	SPOILER LH 2 RET	0	spoiler 2 lh extended
		1	spoiler 2 lh retracted
118	SPOILER LH 3 RET	0	spoiler 3 lh extended
		1	spoiler 3 lh retracted
119	SPOILER LH 4 RET	0	spoiler 4 lh extended
		1	spoiler 4 lh retracted
120	SPOILER LH 5 RET	0	spoiler 5 lh extended
		1	spoiler 5 lh retracted
121	SPOILER LH 6 RET	0	spoiler 6 lh extended
		1	spoiler 6 lh retracted
122	SPOILER LH 7 RET	0	spoiler 7 lh extended
		1	spoiler 7 lh retracted
123	SPOILER RH 1 RET	0	spoiler 1 rh extended
		1	spoiler 1 rh retracted
124	SPOILER RH 2 RET	0	spoiler 2 rh extended
		1	spoiler 2 rh retracted
125	SPOILER RH 3 RET	0	spoiler 3 rh extended
		1	spoiler 3 rh retracted

BM6 31 32 00 0BD Y0-12

Diagram
Figure 044

No	Parameter	bin	Status
126	SPOILER RH4 RET	0	spoiler 4 rh extended
		1	spoiler 4 rh retracted
127	SPOILER RH5 RET	0	spoiler 5 rh extended
		1	spoiler 5 rh retracted
128	SPOILER RH6 RET	0	spoiler 6 rh extended
		1	spoiler 6 rh retracted
129	SPOILER RH7 RET	0	spoiler 7 rh extended
		1	spoiler 7 rh retracted
130	X-FEED VALVE NOT FULLY OPEN	0	x-FEED VALVE fully open
		1	x-FEED VALVE not fully open
131	APU BLEED VALVE NOT FULLY OPEN	0	APU BLEED VALVE fully open
		1	APU BLEED VALVE not fully open
132	BLEED VALVE ENG1 OPEN	0	BLEED VALVE eng 1 closed
		1	BLEED VALVE eng 1 open
133	BLEED VALVE ENG2 OPEN	0	BLEED VALVE eng 2 closed
		1	BLEED VALVE eng 2 open
136	PACK MAN. MODE SELECT 1	0	pack mode auto sel. 1
		1	pack mode manual sel. 1
137	PACK MAN. MODE SELECT 2	0	pack mode auto sel. 2
		1	pack mode manual sel. 2
138	INLET A-ICE V. ENG 1 OPEN	0	inlet anti ice valve eng 1 closed
		1	inlet anti ice valve eng 1 open
139	INLET A.-ICE V. ENG 2 OPEN	0	inlet anti ice valve eng 2 closed
		1	inlet anti ice valve eng 2 open
140	WING A.-ICE V. LH NORM UNCL.	0	wing anti ice valve lh norm. closed
		1	wing anti ice valve lh norm. not closed
141	WING A-ICE V. RH NORM UNCL.	0	wing anti ice valve rh norm. closed
		1	wing anti ice valve rh norm. not closed
142	START VALVE POS ENG 1 CLOSED	0	start valve position eng 1 open
		1	start valve position eng 1 closed
143	START VALVE POS ENG 2 CLOSED	0	start valve position eng 2 open
		1	start valve position eng 2 closed

BM6 31320 0BD20-12

Diagram
Figure 045

No	Parameter	bin	Status
144	LDG DOWN AND LOCKED LH	0	LDG lh down and locked
		1	LDG lh not down and not locked
145	LDG DOWN AND LOCKED RH	0	LDG rh down and locked
		1	LDG rh not down and not locked
146	LDG DOWN AND LOCKED NOSE	0	LDG nose down and locked
		1	LDG nose not down and not locked
147	LDG SQUAT SWITCH LH	0	in flight
		1	on ground
148	LDG SQUAT SWITCH RH	0	in flight
		1	on ground
149	LDG SQUAT SWITCH NOSE	0	in flight
		1	on ground
158	WING A.–ICE V. LH ALT. UNCL.	0	wing anti ice valve lh alt. closed
		1	wing anti ice valve lh alt. not closed
159	WING A.–ICE V. RH ALT. UNCL.	0	wing anti ice valve rh alt. closed
		1	wing anti ice valve rh alt. not closed
160	SPOILER 1+4 FAULT/OFF	0	spoiler 1+4 good and on or inhibitted
		1	spoiler 1+4 fail or off
161	SPOILER 3+2 FAULT/OFF	0	spoiler 3+2 good and on or inhibitted
		1	spoiler 3+2 fail or off
162	SPOILER 5 FAULT/OFF	0	spoiler 5 good and on or inhibitted
		1	spoiler 5 fail or off
163	SPOILER 6 FAULT/OFF	0	spoiler 6 good and on or inhibitted
		1	spoiler 6 fail or off
164	SPOILER 7 FAULT/OFF	0	spoiler 7 good and on or inhibitted
		1	spoiler 7 fail or off
		0	
		1	
		0	
		1	
		0	
		1	

BM 6 31 32 00 0BE A 0–12

Diagram
Figure 046

QUICK ACCESS RECORDER 56TU - REMOVAL/INSTALLATION

R 1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure	
R - 31-31-00, P. Block 501 (Ref. Fig. 401)	AIDS Interconnection Interfaces

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS-EXP	54TU	105/E04
21VU	AIDS-DFDR	7TU	105/E02
22VU	RCDR - CTL	5RK	204/F27

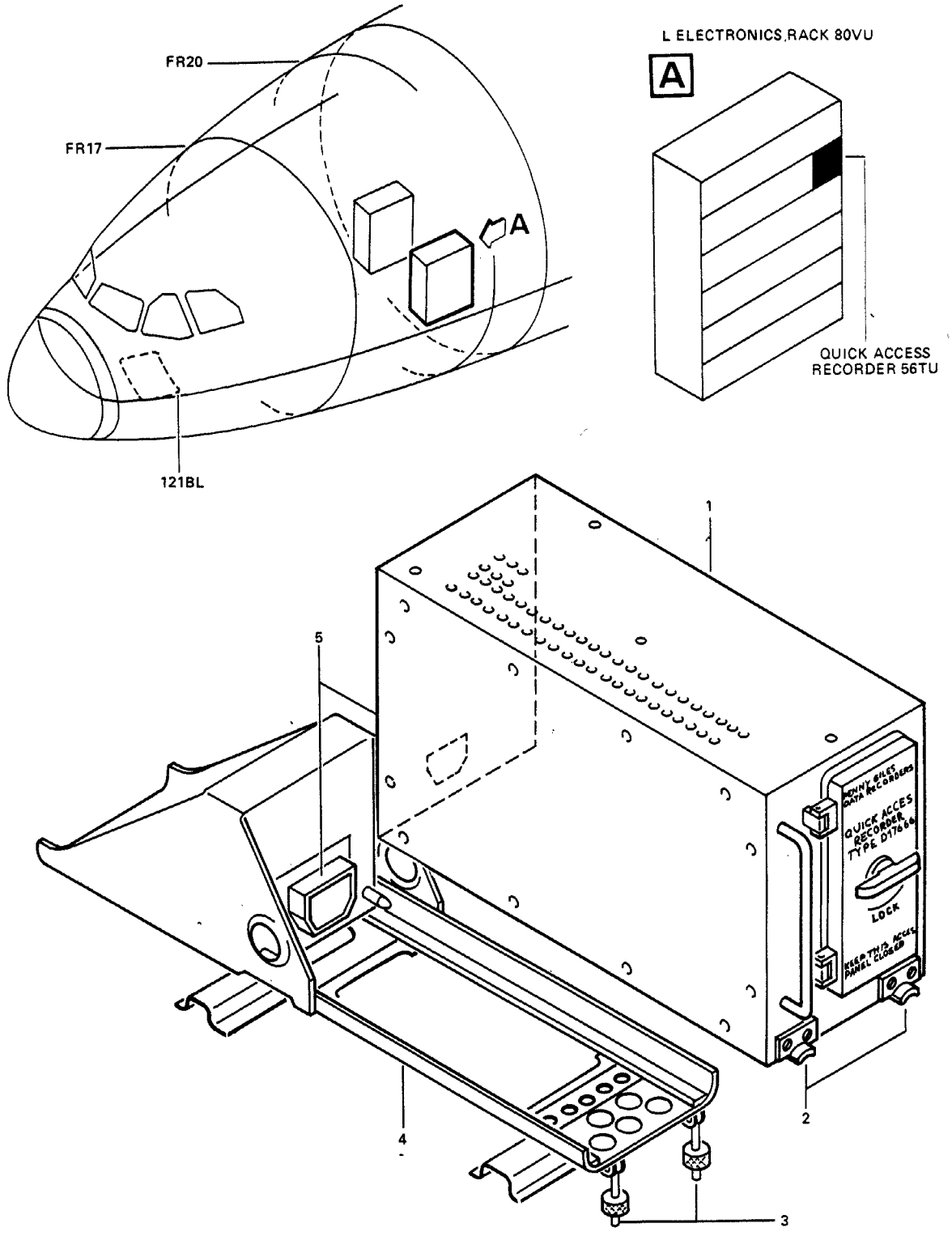
B. Removal
(1)Open access door 121BL.
(2)In L electronics rack 80VU , on shelf 82VU, unscrew knurled nuts (3) retaining Quick Access Recorder (1) and disengage them from studs (2).
(3)Withdraw Quick Access Recorder (1) from rack (4).
(4)Blank electrical connectors (5).
(5)Remove Quick Access Recorder (1).

C. Preparation of Replacement Component
(1)Replacement quick access recorder must present no defects, no traces of corrosion or storage product on electrical connectors.
(2)Clean and inspect Quick Access Recorder interface and/or adjacent area.

D. Installation
(1)Remove blanking caps from electrical connectors (5).
(2)Make certain that electrical connectors (5) are in correct condition.
(3)Install Quick Access Recorder (1) in rack (4).
(4)Lift knurled nuts (3) into position on studs (2) and tighten.
(5)Remove safety clips and tags and close circuit breakers 54TU, 7TU and 5RK.

E. Test
Carry out operational test of quick access recorder (QAR) (Ref. 31-31-00, P. Block 501)

F. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment



BM5 31 32 65 4 APM0 21

Quick Access Recorder
Figure 401

(2)Close access door 121BL.

R OPTICAL QUICK ACCESS RECORDER (O-QAR) 56TU - REMOVAL/INSTALLATION

R 1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure - 31-31-00, P. Block 501 (Ref. Fig. 401)	AIDS Interconnection Interfaces

R 2. Procedure

R A. Job Set-Up
R (1)Open access door 121BL.
R (2)Open, safety and tag the following circuit breaker :

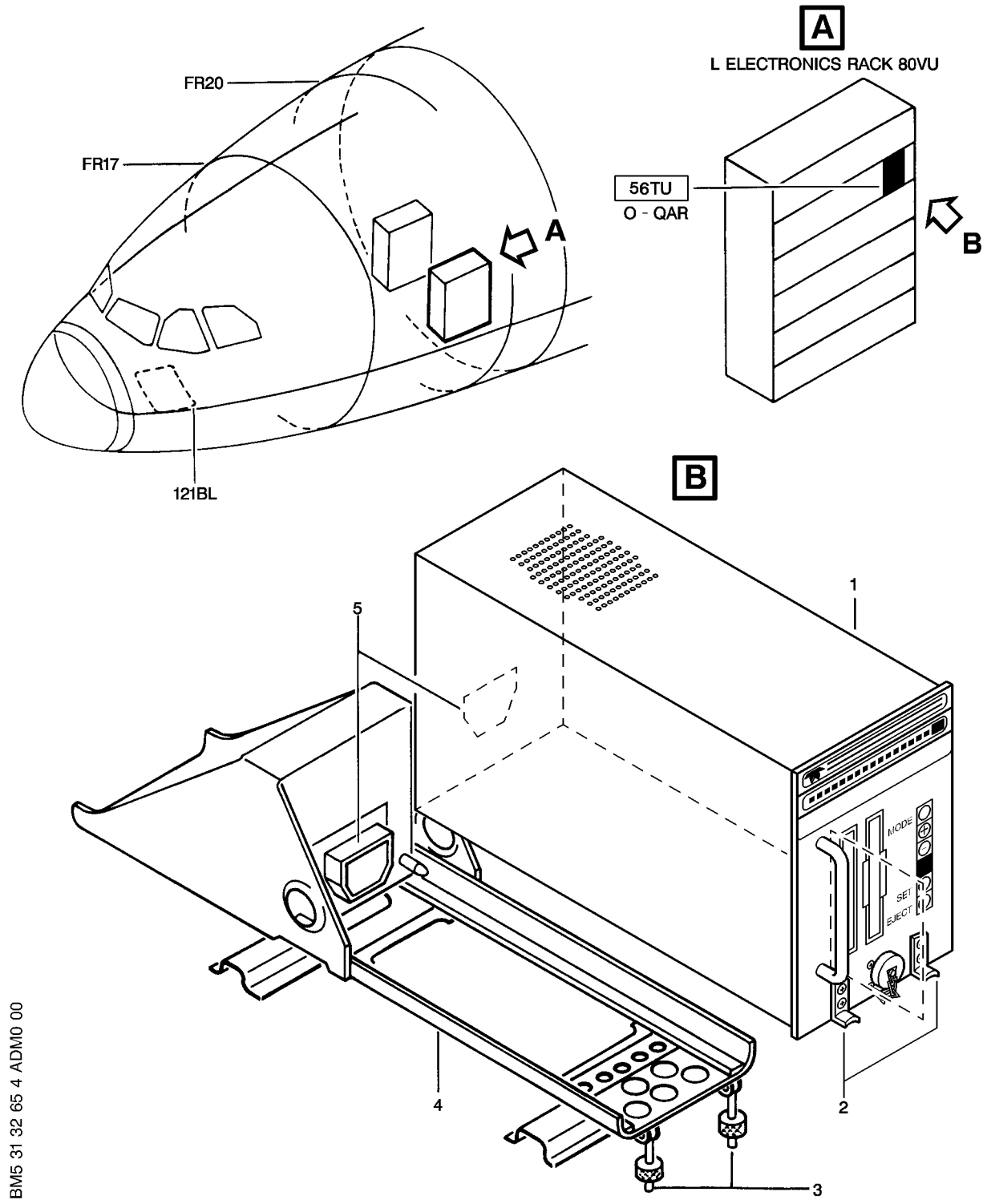
PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/EXP	54TU	105/E 4

R B. Removal
R (1)Unscrew the two retaining nuts (3) of O-QAR (1) and disengage them from lugs (2).
R (2)Withdraw O-QAR (1) from rack (4) taking care not to damage electrical connectors (5).
R (3)Blank electrical connectors (5).
R (4)Remove O-QAR (1).

R C. Installation
R (1)Clean and inspect O-QAR (1) interface and/or adjacent area.
R (2)Remove blanking caps from electrical connectors (5).
R (3)Install O-QAR (1) in rack (4).
R (4)Lift retaining nuts (3) into position on lugs (2) and tighten.
R (5)Remove safety clip and tag and close circuit breaker 54TU.

R D. Test
R Carry out operational test of O-QAR (Ref. 31-31-00, P. Block 501).

R E. Close-Up
R (1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
R (2)Close access door 121BL.



BM5 31 32 65 4 ADM0 00

Optical Quick Access Recorder
Figure 401

QAR CASSETTE - REMOVAL/INSTALLATION

R 1. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedure - 31-31-00, P. Block 501	AIDS Interconnection Interface

(Ref. Fig. 401)

2. Procedure

A. Job Set-Up
(1)Close the following circuit breaker:

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS-EXP	54TU	105/E04

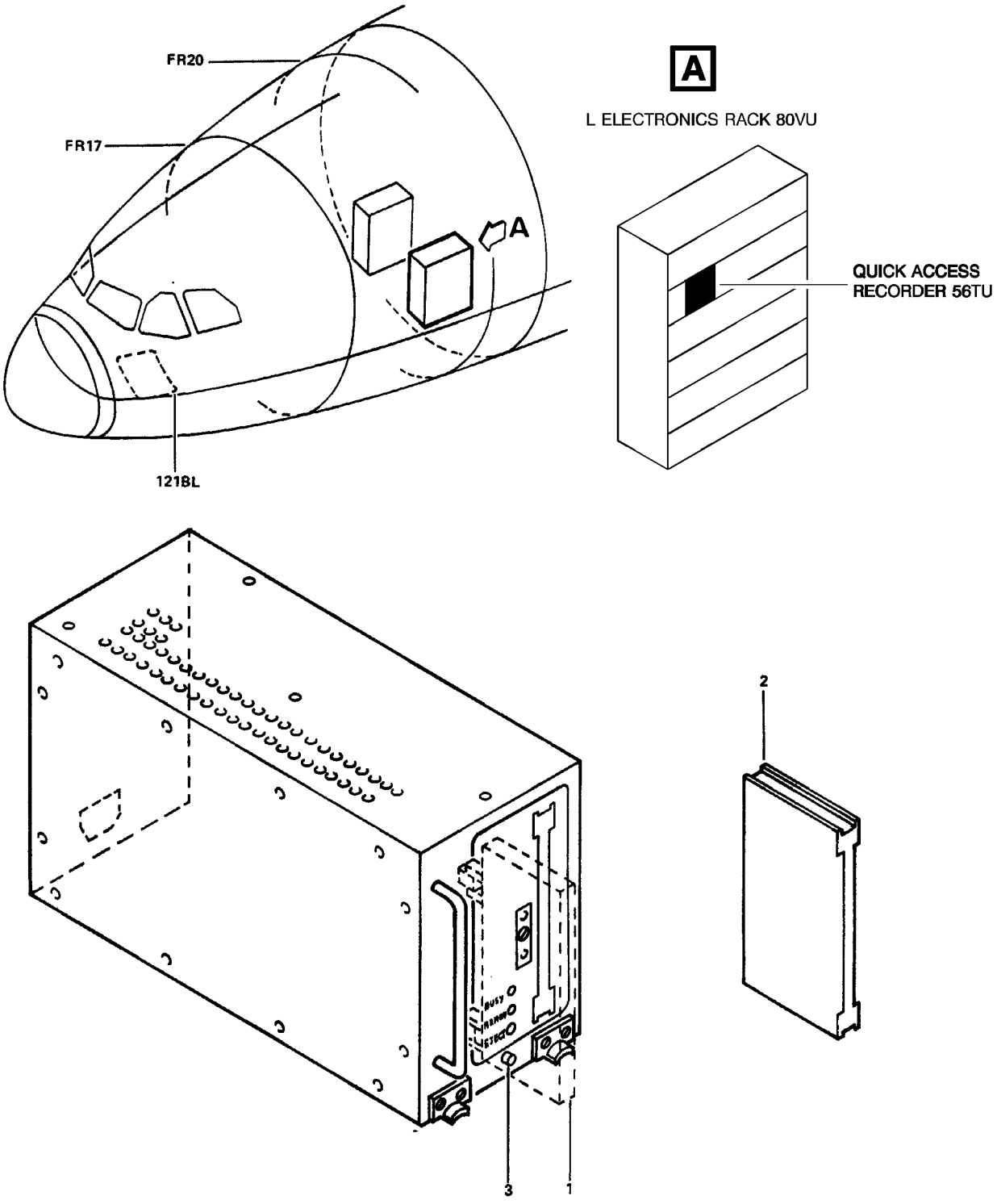
(2)Open access door 121BL.

B. Removal
(1)Open door (1) giving access to QAR cassette (2).
(2)The power indicator (3) and the READY indicator should be lit, and the BUSY indicator should be flashing at a rate of about one flash per second.
(3)Press the EJECT button, this will cause the cassette to be ejected.
NOTE : If power is not connected it is only possible to remove the cassette using a screwdriver through the hole provided for this purpose in the QAR case.
(4)Both BUSY and READY indicators will go out when the cassette is removed.
(5)Remove the cassette (2) and place it in a protective container.
(6)Close access door (1).

C. Installation
(1)Open QAR access door (1).
(2)Insert the cassette (2) into the recess, making sure that the alloy base plate of the cassette is facing to the left.
(3)The cassette will be drawn into the QAR under electro-mechanical control and both the BUSY and READY indicators will light. The QAR will run until it locates the position of the last data to be written, when the BUSY indicator will start to flash steadily.
(4)Close QAR access door (1)
NOTE : if a cassette is inserted with no power being present the cassette will be locked when power is first applied.

D. Test
Carry out operational test of QAR cassette (Ref. 31-31-00, P. Block 501).

E. Close-Up



QAR Cassette
Figure 401

(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door 121BL.

R # O-QAR OPTICAL DISK - 56TU1 - REMOVAL/INSTALLATION

R ## 1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps

(Ref. Fig. 401)

R ## 2. Procedure

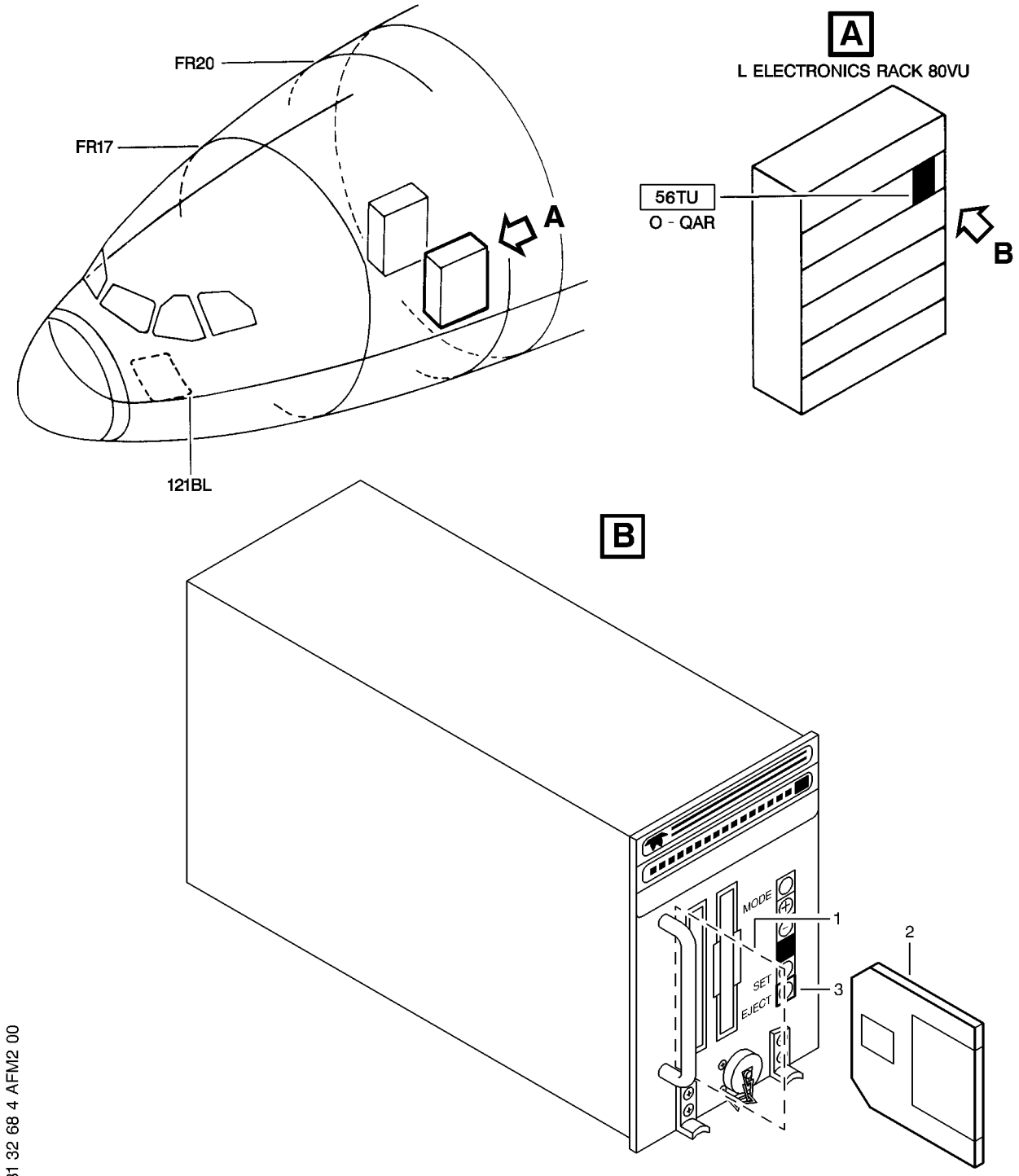
R A. Job Set-Up
R (1)Open access door 121BL.
R (2)Open, safety and tag the following circuit breaker :

PANEL	SERVICE	IDENT.	LOCATION
21VU	AIDS/EXP	54TU	105/E 4

R B. Removal
R (1)Open O-QAR door (1) giving access to optical disk cartridge (2).
R (2)Press EJECT pushbutton switch (3).
R (3)Remove optical disk cartridge (2).
R (4)Close O-QAR access door (1).

R C. Installation
R (1)Open O-QAR access door (1).
R (2)Install optical disk cartridge (2).
R (3)Close O-QAR access door (1).

R E. Close-Up
R (1)Make certain that working area is clean and clear of tools and
R miscellaneous items of equipment.
R (2)Close access door 121BL.



BM5 31 32 68 4 AFM2 00

O-QAR Optical Disk
Figure 401

CENTER OF GRAVITY CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General

R **ON A/C 001-100,

(Ref. Fig. 001)

R **ON A/C 001-100,

NOTE : This computer may only be used on A/C without ACT provision.
For further information see para. 4.A.

The Center of Gravity Control System (CGCS) is part of the aircraft's trim tank system (Ref. to chapter 28-00-00), which is installed to store extra fuel for extra range and for better fuel economy due to center of gravity control and associated trim drag reduction.
The main components of the system are:
- the trim tank in the horizontal stabilizer,
- the Trim Tank Transfer System, (TTTS) used for fuel transfer between the trim tank and the center or inner wing tanks,
- the Center of Gravity Control System (GGCS), used for the determination of the Center of Gravity (CG) and the control of the automatic fuel transfer in forward and aft direction.

The Center of Gravity Control Computer (CGCC) of the CGCS calculates the position of the CG and controls the fuel transfer. For this purpose, the computer consists of a command channel and a monitor channel to monitor its input and output devices and to meet the necessary safety requirements.
The actual center of gravity position is calculated on the basis of the following data:
- fuel quantity in each tank determined by the Fuel Quantity Indication (FQI) system,
- fuel tank moment data (CG of each individual fuel tank),
- zero fuel weight (ZFW) and zero fuel center of gravity (ZFCG).

The latter data is entered before takeoff by the flight crew as load and trim sheet data on the Control and Display Units (CDU) and is transmitted via the Flight Management Computer (FMC) to the CGCC.
In place of the FMC data the CGCC can also get inputs from a primary Weight and Balance System (WBS). The WBS supplies the CGCC with Gross Weight (GW) and CG data instead of ZFW and ZFCG.
The CGCC uses the following additional aircraft data:
- position of the trim tank isolation valve,
- engine fuel flow,
- baro altitude,

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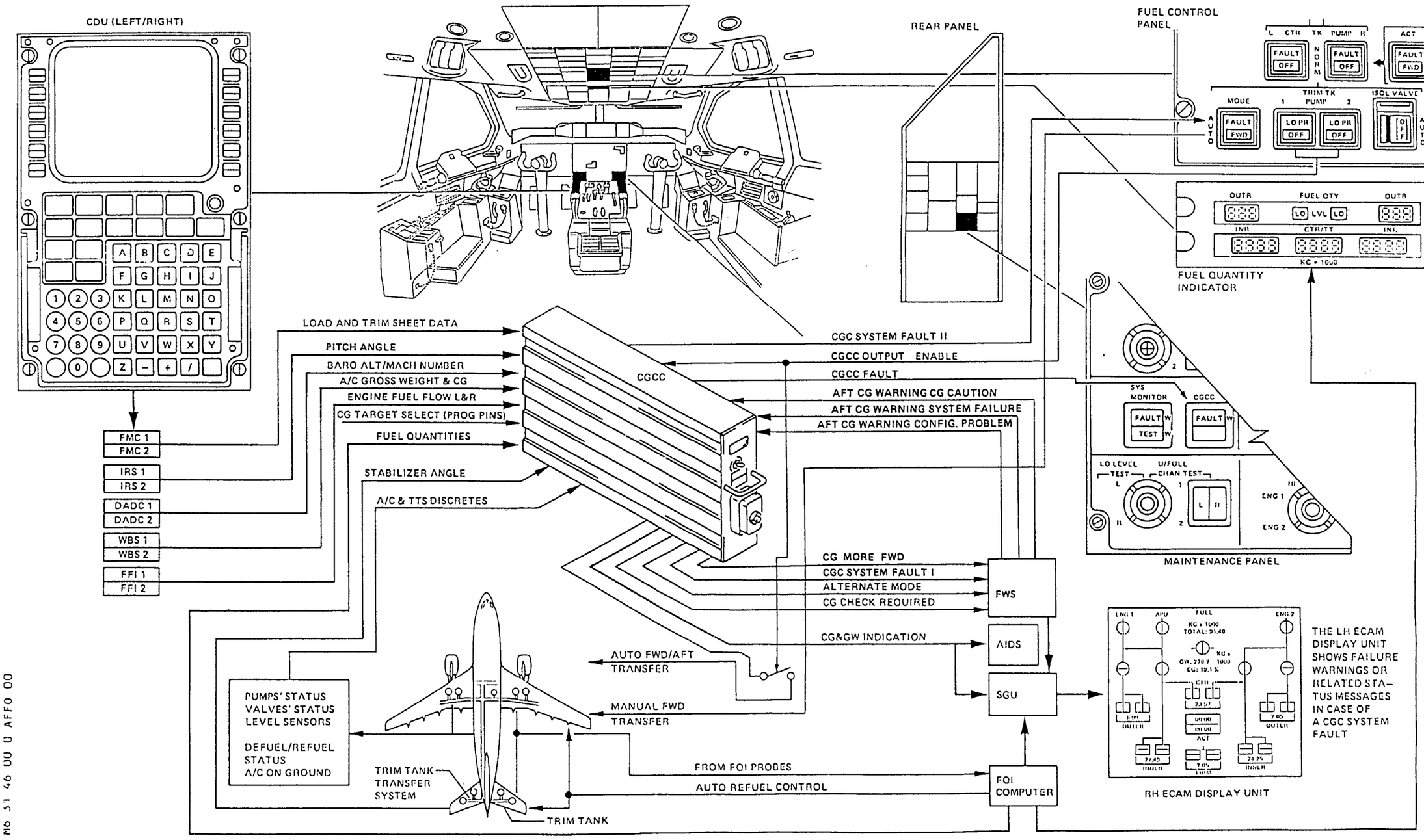


CGCS and Related Systems
Figure 001

MD 31 46 UU U AFFO 00

- mach number.

The influences of this data on the calculations will be explained in the following paragraphs.

As a result of the CG determination, the CGCC generates the command signals for the pumps and valves of the trim tank transfer system to equalize the calculated actual center of gravity and the target center of gravity.

The center of gravity control with respect to the target CG depends on the following conditions:

- with the aircraft on the ground, there is no CG control,
- with the aircraft in flight below FL 205 only forward transfers to reach the target CG are possible,
- with the aircraft in flight above FL 205 forward or aft transfers are initiated by the CGCC to reach the target CG,
  The target CG is set in accordance to airline configuration as for example the airline load and trim sheet procedure and the aircraft internal layout,
- with the aircraft descending below FL 200, the CG control is terminated and all trim tank fuel is transferred forward to the center tank (normally before landing).

In normal operation below or above FL 205, the system maintains the CG within 0,5 % MAC forward of the target center of gravity. For this it starts a FWD or aft transfer. Aft transfers are only possible above FL205. Above FL205 the CGCC starts an aft transfer if the actual CG is more than 0.7 % MAC before the target CG. The aft transfer stops if the actual CG is 0.2 % MAC before the target CG. The monitor function of the CGCC comprises the following:

- monitoring of the transfer system (valves and pumps),
- monitoring of all input data (completeness and validity),
- self-monitoring (cross-checks between CGCC command and monitor channels).

In addition to the Control and Display Units, the following control and displays for the CGCS and its associated systems are located in the flight compartment

- TRIM TK MODE pushbutton on the fuel control panel, for the selection of a manual FWD transfer or automatic control of the transfer system,
- TRIM TK PUMP 1/2 pushbuttons on the fuel control panel, for the pre-selection of the trim tank pumps and valves, and to enable/disable the CGCC to control valves and pumps of the trimtank transfer system.
- FAULT caption on the TRIM TK MODE pushbutton, for indication of a system failure either from the FWC, the isolation valve control logic or the CGCC.
- ISOL VALVE pushbutton on the fuel control panel, for isolation of the trim tank.
- CGCC FAULT caption on the maintenance panel, for indication of a CGCC failure,
- display units of the ECAM system, for display of FQI data, center of gravity, gross weight and system status data of the CGCS. The system status is displayed on the LH ECAM Display while the other data are displayed on the FUEL page of the RH ECAM Display,
- fuel quantity indicator on the fuel control panel, for the indication of fuel data.

The CGCC is also connected to the Aircraft Integrated Data System (AIDS),

for data reporting and recording.

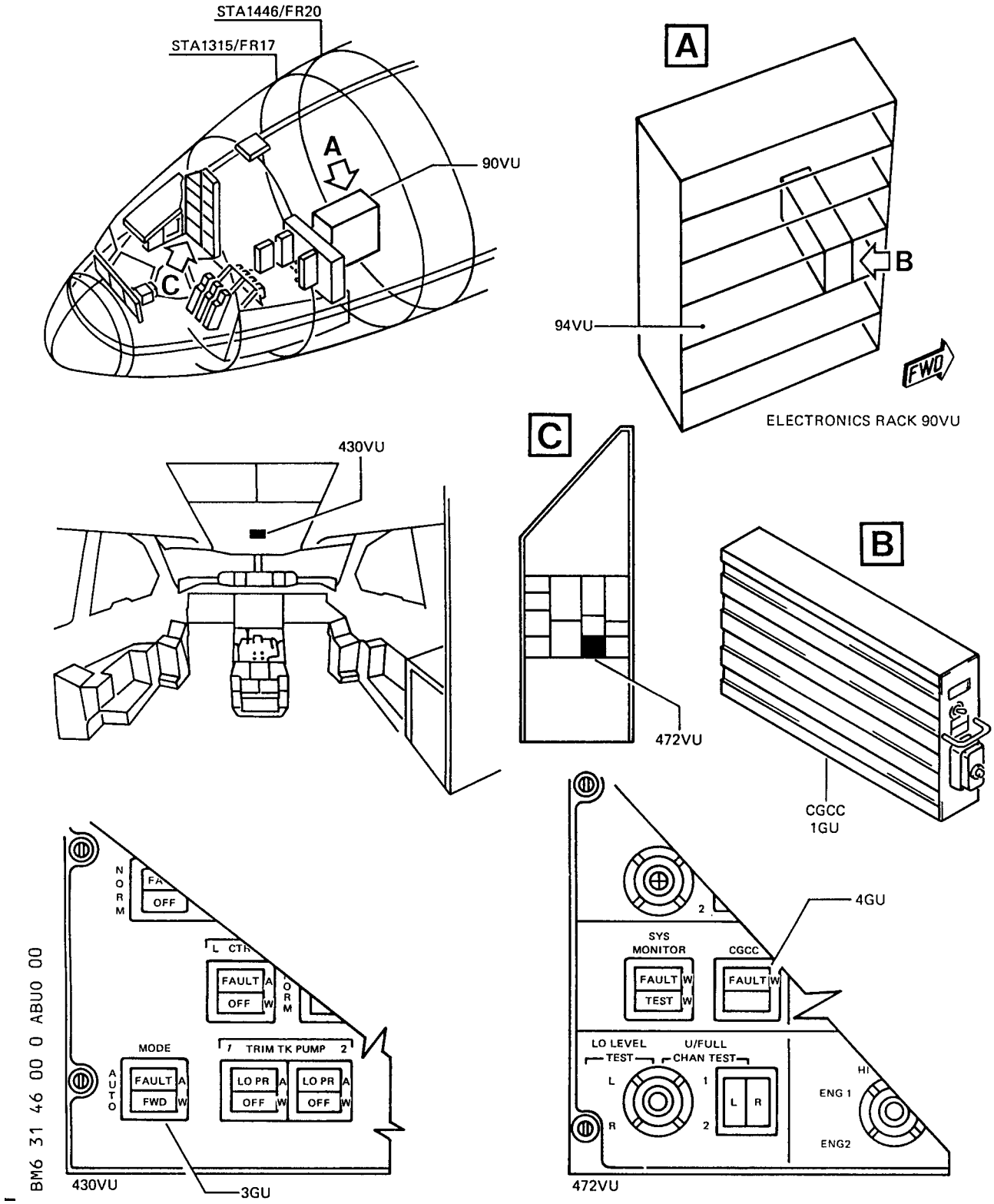
2. Component Location

R **ON A/C 001-100,

(Ref. Fig. 002)

R **ON A/C 001-100,

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF
1GU	COMPUTER, CGC	94VU	121	121BL	N/R
3GU	P/BSW INDICATOR, FAULT/FWD	430VU	210		N/R
4GU	INDICATOR, FAULT	472VU	212		N/R



Component Location
Figure 002

3. System Description

A. Center of Gravity Control System

R **ON A/C 001-100,

(Ref. Fig. 003)

R **ON A/C 001-100,

The illustration shows the CGCC and its associated input and output systems.
The main component of the CGCS is the CGCC consisting of a command and a monitor channel. The command channel calculates the CG position, determines the target CG and generates control signals for the valves and pumps of the trim tank transfer system. By transferring fuel in FWD or AFT direction, a CG shift of more than 11 % MAC may be achieved under control of the CGCC. The monitor channel checks thevalidity of input data, the computation of CG position and target CG and checks the status of the transfer system (pumps, valves and sensors).
Both channels perform self-monitoring at power-up and cross-check functions of the inputs and results of the other channel.
The calculation of CG position is based on the following data:
- on Zero Fuel Weight and Zero Fuel CG, determined by load and trim sheet data inserted by the crew and transmitted by the FMS,
- fuel quantity of all six tanks, supplied by the FQI computer,
- fuel moment arms, corrected for A/C pitch attitude by the Inertial Reference System (IRS).

NOTE : If a WBS is installed, the CGCC can use the CG- and GW-data from the WBS instead of the FMS data. The CGCC accepts GW data up to 200 t.

The target CG is determinated with respect to the following data:
- airline-dependent safety margins between 0.0 % MAC and 1.5 % MAC, selected by program pins on the CGCC in steps of 0.5% MAC,
- the flight level of the A/C.

NOTE : The first selected margin remains constant for a specific aircraft during flight.
All pins are normally grounded unless otherwise specified by customer option.

The target CG is the nominal value for CG control. For flights below an altitude of FL 205 or before the A/C reaches this flight level

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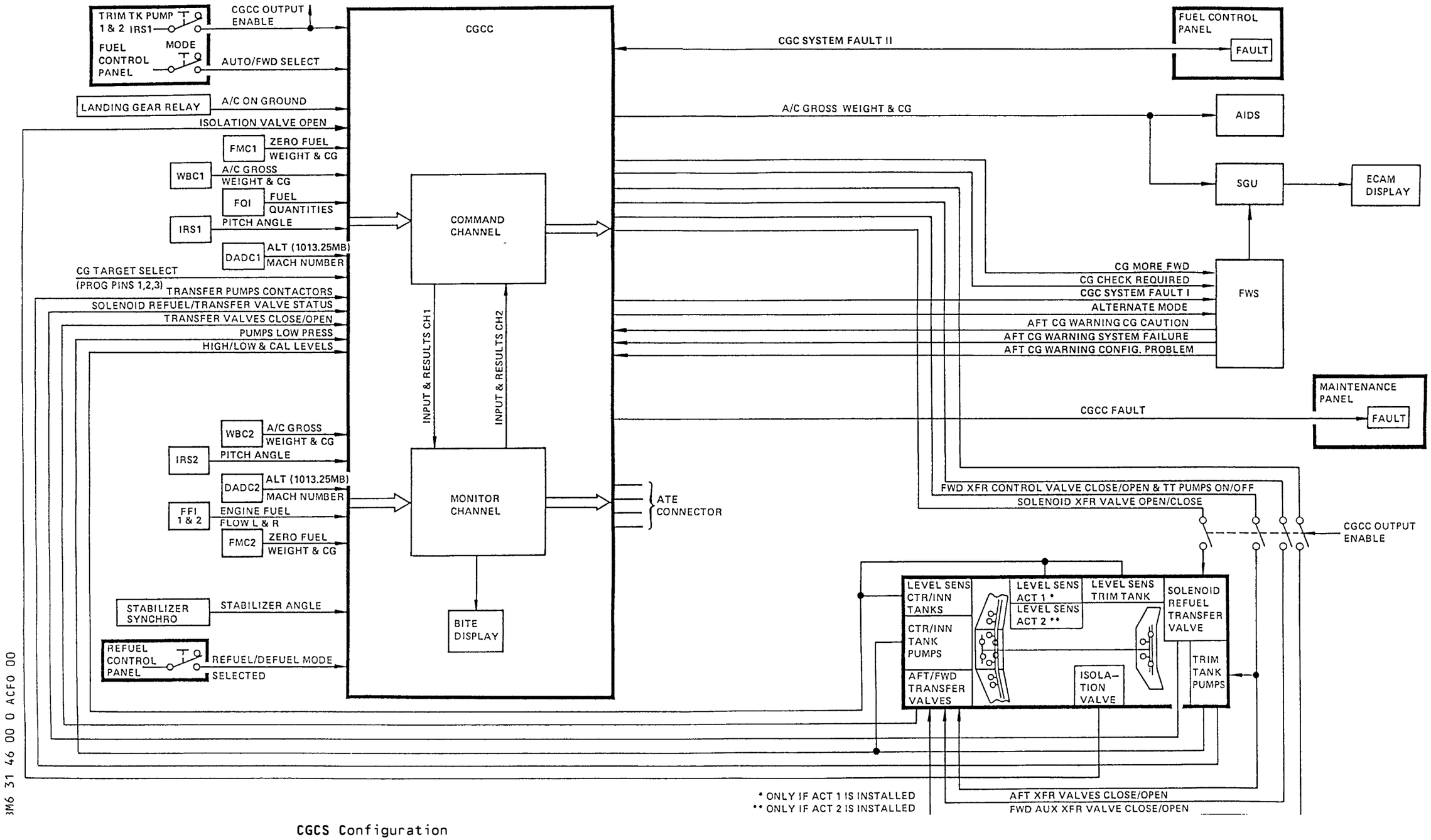

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CGCS Configuration
Figure 003

(but with the isolation valve open), the target CG is set to the subsequent values:
- from 31.81% MAC - delta CG at 80.0 tons
- to   33.58% MAC - delta CG at 128.6 tons
- to   35.41% MAC - delta CG at 145.0 tons
- to   35.50% MAC - delta CG at 150.0 tons.

Above FL 205 the target CG has the subsequent values:
- 37.50% MAC - delta CG at 150.0 tons
- 35.30% MAC - delta CG at 80.0 tons

with linear variation in between.
The delta CG is a safety margin and defines operational limits.
The limits are variable and depend on the airline load and trim sheet procedure.

The target CG values mentioned before are valid under normal conditions. In case of the following possible abnormalities the target CG is additionally reduced:

- if in flight the FQI system transmits fuel quantity data with a degraded accuracy (Bit 11 in the FQI ARINC 429 data is logical "1", see para. 7.A. Interfaces) the CGCC remains in normal mode but reduces the target CG by 1.5% MAC,
- if the FWS sends the signal AFT CG WARNING CG CAUTION, the CGCC reduces the target CG by 1.5% MAC or an additional 2.3 % MAC if the first transfer is not sufficient to leave the AFT CG WARNING CG CAUTION area.

As a result of the CG position calculation and target CG determination, the command channel sends control signals to the pumps and valves of the transfer system to achieve the required CG shift and receives the status signals of the controlled components.
The signal AFT CG WARNING CG CAUTION will lead to a fast FWD transfer. If the target CG is reduced by more than 1.5 % MAC second FWD shift of the target CG) the message CG MORE FWD will be sent to the ECAM.
Besides, the command channel provides the FUEL Page of the RH and LH ECAM display with gross weight (GW) and A/C center of gravity (CG). It sends the CG CHECK REQUIRED signal via the FWS to LH ECAM Display to show the message: ZFW OR ZFCG DISAGREE. And it generates the CGCS FAULT signal for the indication of a system or computer fault on the fuel control panel.
The monitor channel of the CGCC computes the present CG position and the target CG as described for the command channel. The comparsion of the computed data from the two channels makes certain that the aft limit can not be exceeded without an indication of this fact.
The monitor channel also monitors the system to detect and locate faults within the CGCC and its associated systems. If a fault is detected, it stores the fault type and its location in a nonvolatily memory. The contents of this memory are indicated on a BITE display during a flight history test.
The CGCC provides the following monitor functions:

- availability of a dual WBS, resulting in an automatic switch-over to FMS inputs, if WBS not available or fails,
- availability of both FMS inputs,
- Monitoring of transfer system components to detect jamming of valves and pump failures.
- Monitoring of all input signals for completeness, validity, absence and values out of range.

If both FMS send valid data and if the data are within certain limits (ZFW <441 lbs and ZFCG <0.1% MAC), the CGCC accepts these data. It keeps the data from the FMS1 in its nonvolatile memory, if they differ from the FMS data kept before.

If both FMS send calid data which are out of the allowed tolerances (ZFW <441 lbs or ZFCG <0.1% MAC), the CGCC gives priority to the FMS1.
It sends the message ZFW OR ZFCG DISAGREE to the LH ECAM display, if the FMS1 data differ from the data which are already kept in its nonvolatile memory. The message it not shown if no data was kept before in the CGCC.
If one of the two FMS sends invalid data, the CGCC accepts only the data

from the good FMS. It sends the message ZFW OR ZFCG DISAGREE TO THE LH ECAM display, if the FMS data differ from the data kept before in its nonvatile memory. The message is not shown if no data was kept before in the CGCC.
Gross weight /GW) and center of gravity (CG) are shown on the FUEL page of the RH ECAM display. The pilots have to check the GW and the CG against the load and trim sheet data if the message ZFW OR ZFCG DISAGREE is shown on the LH ECAM display. The message disappears after takeoff.
The monitor channel sends the ALTERNATE MODE signal and the CGC SYSTEM FAULT signal to FWS. To alert the crew the FWS has these messages displayed on the ECAM.
The monitor channel also generates the CGCC FAULT signal for the indication of a computer fault on the maintenance panel.

NOTE : Self-monitoring is carried out by both channels and includes the following functions:
- monitoring its own functions continuously,
- monitoring the power supply of the opposite channel,
- performing cross-checks by monitoring input data, computer results and control commands of the opposite channel.

All detected abnormalities are stored in a nonvolatile BITE memory and indicated in the CGCC maintenance word for readout on the BITE display. However, the CGCC enters alternate mode only if a fault affects the safety of CG control.

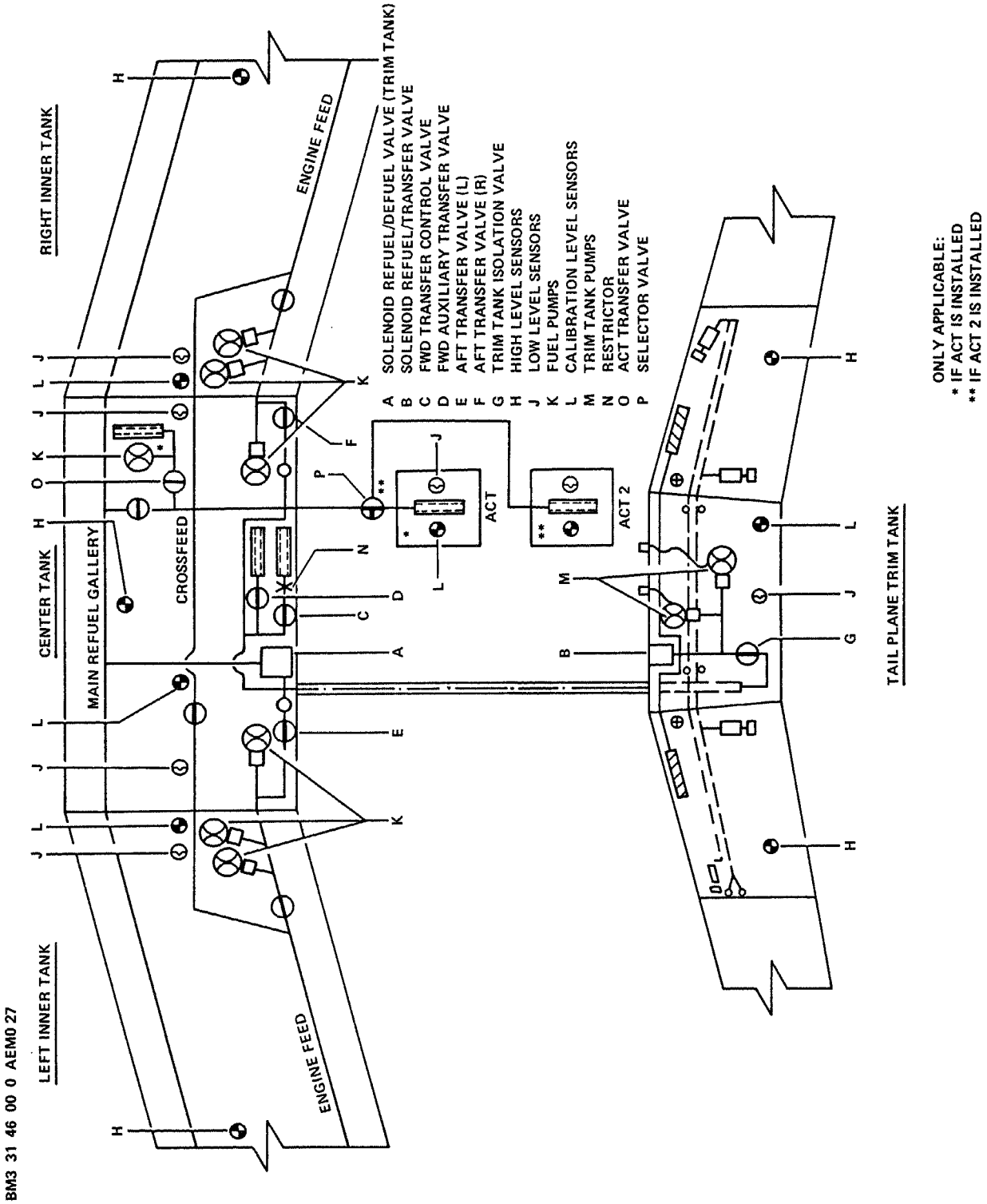
B. Trim Tank Transfer System

R **ON A/C 001-100,

(Ref. Fig. 004)
(Ref. Fig. 005)

R **ON A/C 001-100,

The referenced illustrations show the TRIM TANK TRANSFER SYSTEM (TTTS) including the optional ACT1 and ACT2, and the status of the valves and pumps for fuel transfer operations.
The TTTS, consisting of pumps, valves and level sensors, is capable to transfer fuel in the FWD and Aft direction. The fuel transfer in flight is automatically controlled by the CGCC. An override facility, however, enables the flight crew to initiate the FWD fuel transfer manually.
The trim tank has a capacity of approximately 5 t and is connected via the transfer pipe to the main refuel gallery. It is provided with two pumps, used for FWD transfer, a refuel transfer valve, an isolation valve and a number of high/low and calibration level sensors.
The transfer pipe is feed through the main landing gear bay. In the landing gear bay the transfer pipe is provided with a trim tank refuel/



Fuel System Architecture
Figure 004

CGCC MODE	TT-PUMPS 1 AND 2	VALVE A	VALVE B	VALVE C	VALVE D	VALVE E	VALVE F
NO TRANSFER	OFF	CONTROLLED ONLY BY FQI SYSTEM	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
AFT TRANSFER CENTER TANK TRIM TANK	OFF		OPEN	CLOSED	CLOSED	OPEN	OPEN
AFT TRANSFER INNER WING TANKS TRIM TANK	OFF		OPEN	CLOSED	CLOSED	OPEN	OPEN
AFT TRANSFER LEFT INNER WING TANK TRIM TANK	OFF		OPEN	CLOSED	CLOSED	OPEN	CLOSED
AFT TRANSFER RIGHT INNER WING TANK TRIM TANK	OFF		OPEN	CLOSED	CLOSED	CLOSED	OPEN
NORMAL FORWARD TRANSFER	ON		CLOSED	OPEN	CLOSED	CLOSED	CLOSED
FAST FORWARD TRANSFER	ON		CLOSED	OPEN	OPEN	CLOSED	CLOSED
GRAVITY FWD INHIBITION MODE	OFF		CLOSED	CLOSED	CLOSED	OPEN	OPEN

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Valves and Pumps Status during Transfer Operation
Figure 005

defuel valve, two AFT transfer valves, a FWD transfer control valve, used for normal forward transfer, and a FWD auxiliary transfer valve additionally used for fast forward transfer. The FWD transfer control valve outlet incorporates a restrictor to reduce the transfer rate approximately to engine burn rate.

The transfer system is used to refuel the trim tank, if more fuel is necessary for a mission than the A/C can keep in its wing tanks, the center tank and the additional center tanks, if installed.

The refuelling of the trim tnk is done simultaneously with the refuelling of the other tanks via the transfer pipe.

The trim tank refuel/defuel valve and the refuel transfer valve are then under control of the refuel switch and the FQI system.

If the required quantity is reached and the trim tank fails to shutoff on the FQI signals, the valves will be closed by a signal from the high level sensor. Besides, the valves are closed by an overflow sensor in the trim tank surge.

To allow loading flexibility at forward CG positions, on flights which do not require all tanks to be filled, a fixed quantity of fuel may be loaded into the trim tank by means of a manual transfer. This is only possible with fuel loads greater than wing tanks full.

If the CGCC is to control the transfer system automatically, the following settings must be made on the fuel control panel;

- one or both TRIM TK PUMP pushbuttons must be set to on, and
- the TRIM TK MODE pushbutton must be set to AUTO.

In addition, ZFCG and ZFW must be input by the crew via the FMS, or GW and CG must be received from the WBS.

When an aft transfer is required, the CGCC opens the aft transfer valves (E and/or F) and the refuel transfer valve (B). Fuel is then transferred from the center or inner wing tanks to the trim tank, depending on which pumps are energized by the basic fuel system.

When an aft transfer is required, the CGCC opens the aft transfer valves (E and/or F) and the refuel transfer valve (B). Fuel is then transferred from the center or inner wing tanks to the trim tank, depending on which pumps are energized by the basic fuel system. If the inner wing tanks are used, the CGCC takes care for symmetrical transfer out of these tanks by initiating an asymetrical transfer if the fuel difference between the two tanks is greater than 200 kg.

The aft transfer from the inner tanks is stopped, when the fuel content of at least one inner tank decreases below 500 kg.

The transfer is terminated if a failure occurs during an aft transfer from the center tank, for example if only one pump is active.

When the required fuel quantity has been transferred, the transfer valves are closed.

A forward transfer is always carried out between the trim tank and the center tank. During a normal FWD transfer the trim tank pumps are energized and the FWD transfer control valve (C) opens.
Each forward transfer during CG control in normal mode causes the CG to move forward by approximately 0.5 % MAC. If the low level sensors in the trim tank indicate dry state and fuel quantity is indicated below 200 kg by the FQI system, the trim tank pumps are switched off after a time delay of 3 min.
A fast forward transfer is initiated by the CGCC if the aircraft descends below FL 200.
In that case both valves (FWD transfer control valve and FWD auxiliary transfer valve) are used. Either in normal mode or in alternate mode, the CGCC monitors the transfer and prevents overfilling of the center tank.
Both valves are also used if a manual FWD transfer is selected by means of the TRIM TK MODE switch. Figure 005 shows which pumps and valves are operated by the CGCC under different transfer modes.
Fuel transfer is inhibited if the trim tank isolation valve, controlled by relais of the transfer system, is closed. The valve closes before landing when gears are extended. FWD transfer should be completed before. The valve opens again during refuelling and in flight after gear retraction and slats in.
An emergency forward transfer is carried out by means of gravity fuel transfer in the event of total loss of A/C power.

C. Power Supply

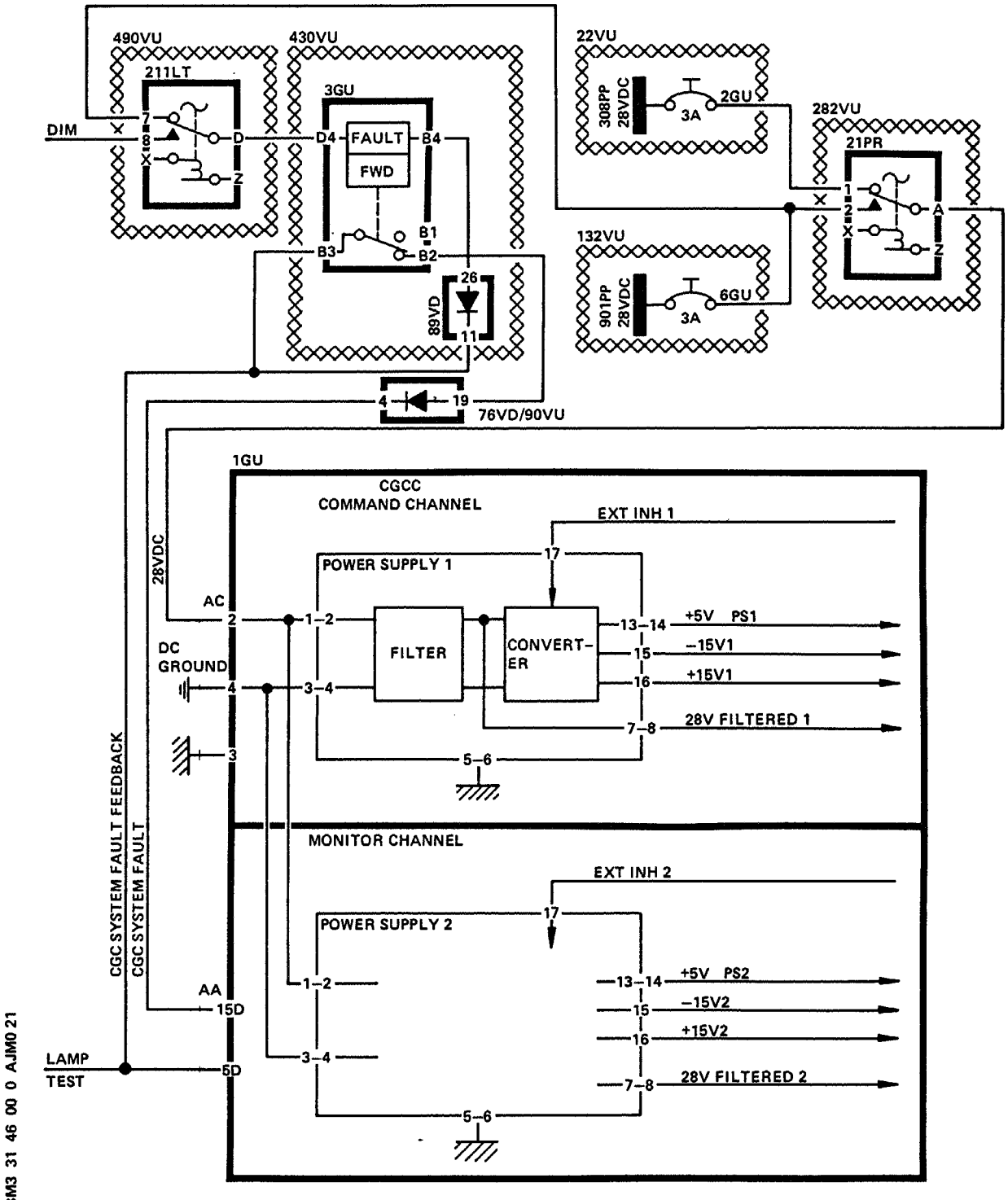
R **ON A/C 001-100,

(Ref. Fig. 006)

R **ON A/C 001-100,

The CGCC is supplied with electrical power as long as the aircraft electrical network is supplied with power. With the A/C in flight or on the ground, the CGCC is supplied with 28 V from DC busbar 308PP via circuit breaker 2GU on panel 22VU. The DC voltage is converted from generator 1 AC power or APU AC power. With the A/C on the ground, during refuelling the CGCC is supplied by 28 V from the battery system via DC busbar 901PP and circuit breaker 6GU on panel 132 VU. In cases of emergency (voltage loss), the system FAULT lamp on the fuel control panel is supplied only by busbar 901PP.
The computer contains two identical power supplies, one for each channel, consisting of a filter section and DC/DC converter. Each power supply generates voltages of +5 V DC to operate the electronic circuit boards of its related channel. The supplies are monitored by the Central Processing Units (CPU) to make certain that:
- power interruptions up to 200 ms duration do not degrade system performance,
- power interruptions of longer duration disengage the system.

These tasks are realized by monitoring the 28 V DC aircraft supply with the help of 28 V FILTERED, derived from the filter sections of the power supplies. The lower limit for full performance of the CGCC is 21 V DC.



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Power Distribution and Supply
Figure 006

4. Component Description

A. Center of Gravity Control Computer (1GU)

R **ON A/C 001-100,

(Ref. Fig. 007)

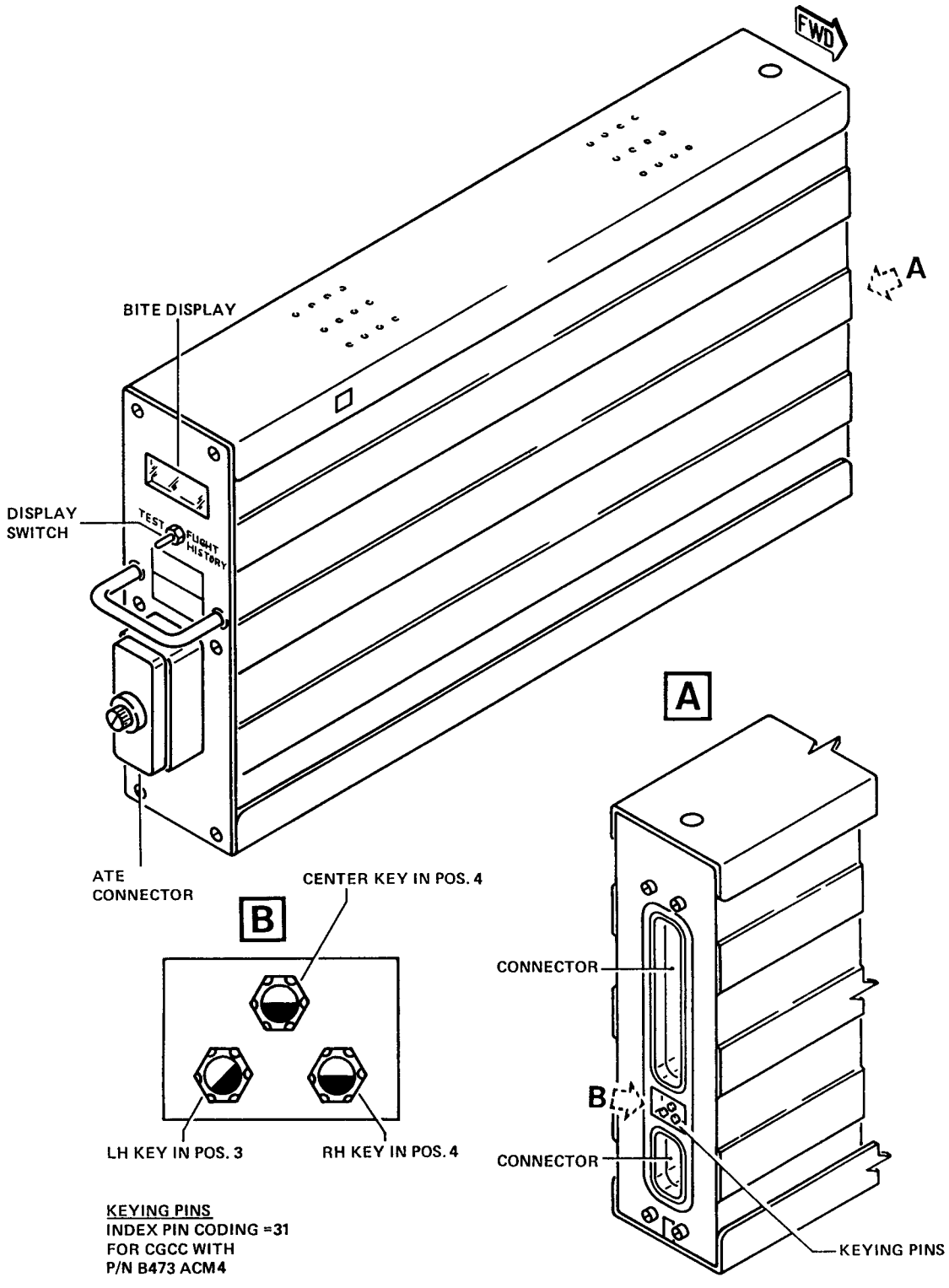
R **ON A/C 001-100,

(1)Description
The CGCC evaluates and controls the aircraft's "in-flight" CG to a targeted figure by the transfer of fuel in either FWD or AFT direction and thereby reduces fuel consumption.
Computations are based on data signals received on various ARINC 429 buses and on aircraft discrete inputs. The computer is designed as a self-monitoring duplex computer in one box. It is housed in a 2 MCU case conforming to ARINC 600 specifications and installed in electronics rack 94VU. The front panel is provided with an alphanumeric BITE display. A spring-loaded center off switch allows availability test initiation and flight history readout. Besides an ATE connector is installed, allowing bench testing in the shop. The front face is also equipped with a handle for insertion and extraction of the computer.
The rear is provided with a connector and keying pins for shelf connection. The keying pins conform also to ARINC 600. The index pin coding for this computer is 31. That means the keying pins are in the subsequent positions:
- left hand key in pos. 3,
- center key in pos. 4,
- right hand key in pos. 4.

This allows an installation of this CGCC on aircraft with two or one additional center tanks or without ACT.
The dual channel layout of the CGCC uses similar hardware consisting of two 80C31 one chip 8-bit microprocessors, volatile and nonvolatile memories, input and output devices and power supplies.
The software with respect to algorithms, libraries and instructions, is dissimilar. The programs are written in PLM Macro as well as in ASM Macro. They cover the software for aircrafts with or without provisions for the ACT1 and/or the ACT2.

(2)Physical Characteristics

Power requirements	28 V DC, 1.2 A (computer) and 1.2 A (discretes outputs)
Power dissipation	<30 W
Packaging	ARINC 600, 2 MCU



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CG Control Computer
Figure 007

Size:	
Length	382.0 mm (15.04 in.)
Width	57.2 mm (2.25 in.)
Height	194.5 mm (7.66 in.)
Weight	<3.7 kg
Cooling	By forced air per ARINC 600 specification

(3)Operation

The CGCC contains the following printed circuit boards:

- ARINC, Command A10, Monitor A20
- CPU, Command A11, Monitor A21
- Display, A3
- Power supply, A12, A22
- Mother board

(a)ARINC Boards

R **ON A/C 001-100,

(Ref. Fig. 008)

R **ON A/C 001-100,

(Ref. Fig. 009)

R **ON A/C 001-100,

Each ARINC board accepts the reception of data on 7 lines at a rate of 12 to 14.5 Kb/s and on one line at 100 Kb/s, transmits data on one line at a rate of 13.66 Kb/s and communicates with the CPU via a dual-access common RAM. The RAM is used by the ARINC board in a write only mode and by the CPU board in both read and write modes.

When the RAM is used by the ARINC board, it receives addresses directly from the sequencer via a buffer and data from a FIFO RAM (within the sequencer) also via a buffer.

When used by the CPU, the memory is addressed by the microcontroller via a one-directional buffer (A0-A7) and messages to the microcontroller (read) or from the microcontroller to the RAM (write) are fed via a bi-directional buffer (D0-D7). The ARINC output data transmission system operates at 13.66 Kb/s through a shift register, a sequencer and an ARINC modulator.

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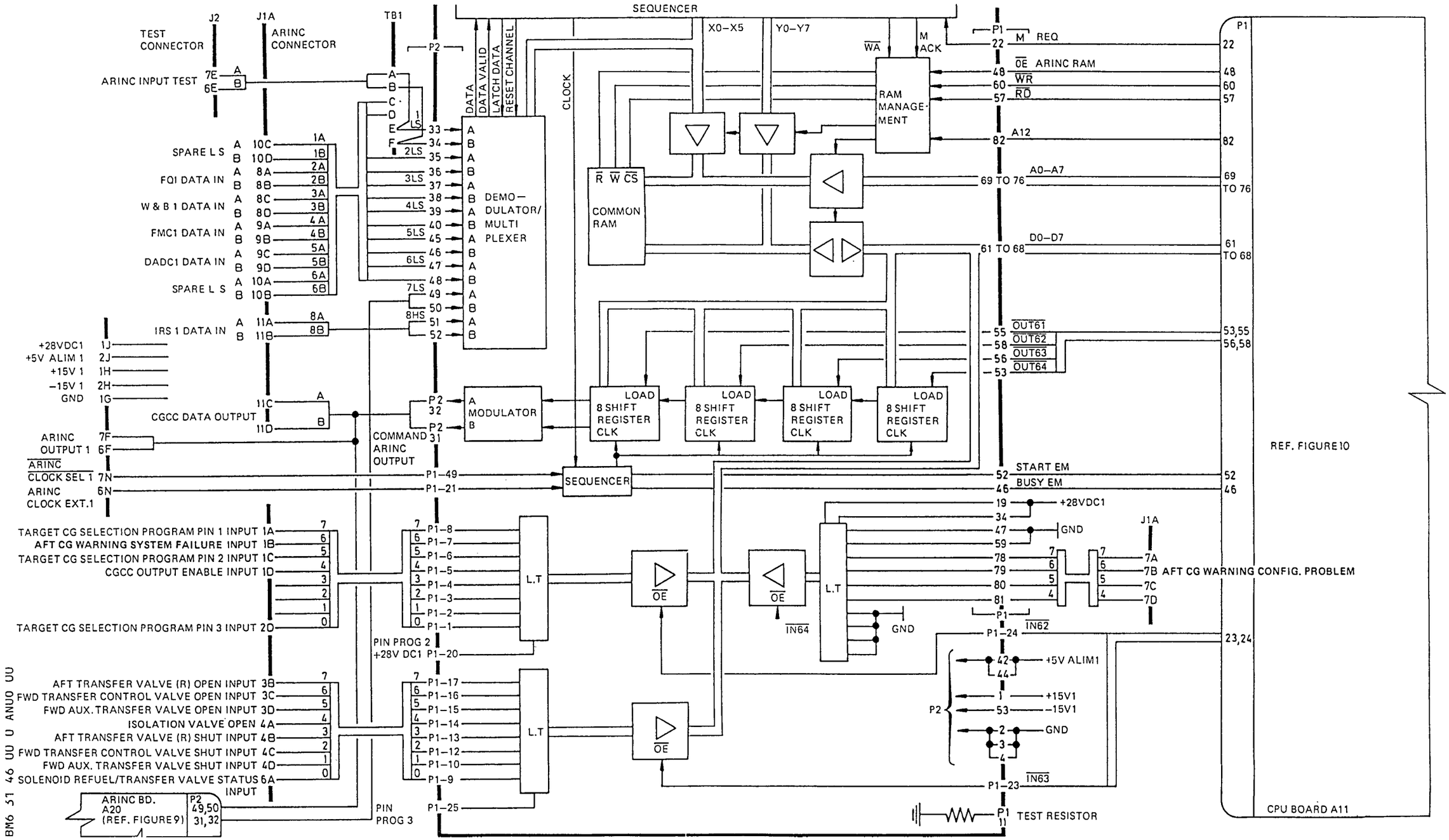
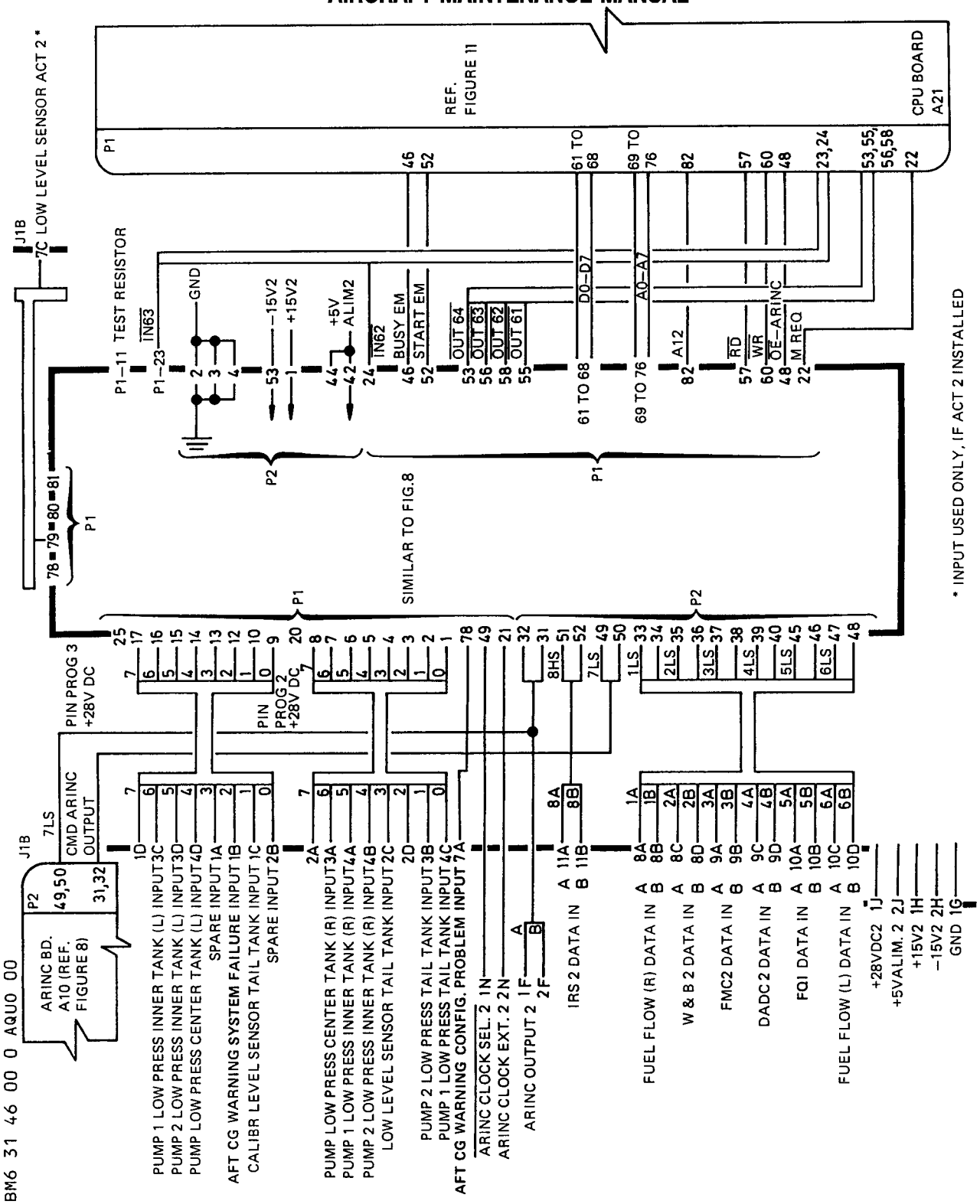


ARINC Board A10 Schematic
Figure 008



ARINC Board A20 Schematic
Figure 009

(b)CPU Boards

R **ON A/C 001-100,

(Ref. Fig. 010) (Sheet 1 of 2)

R **ON A/C 001-100,

(Ref. Fig. 010) (Sheet 2 of 2)

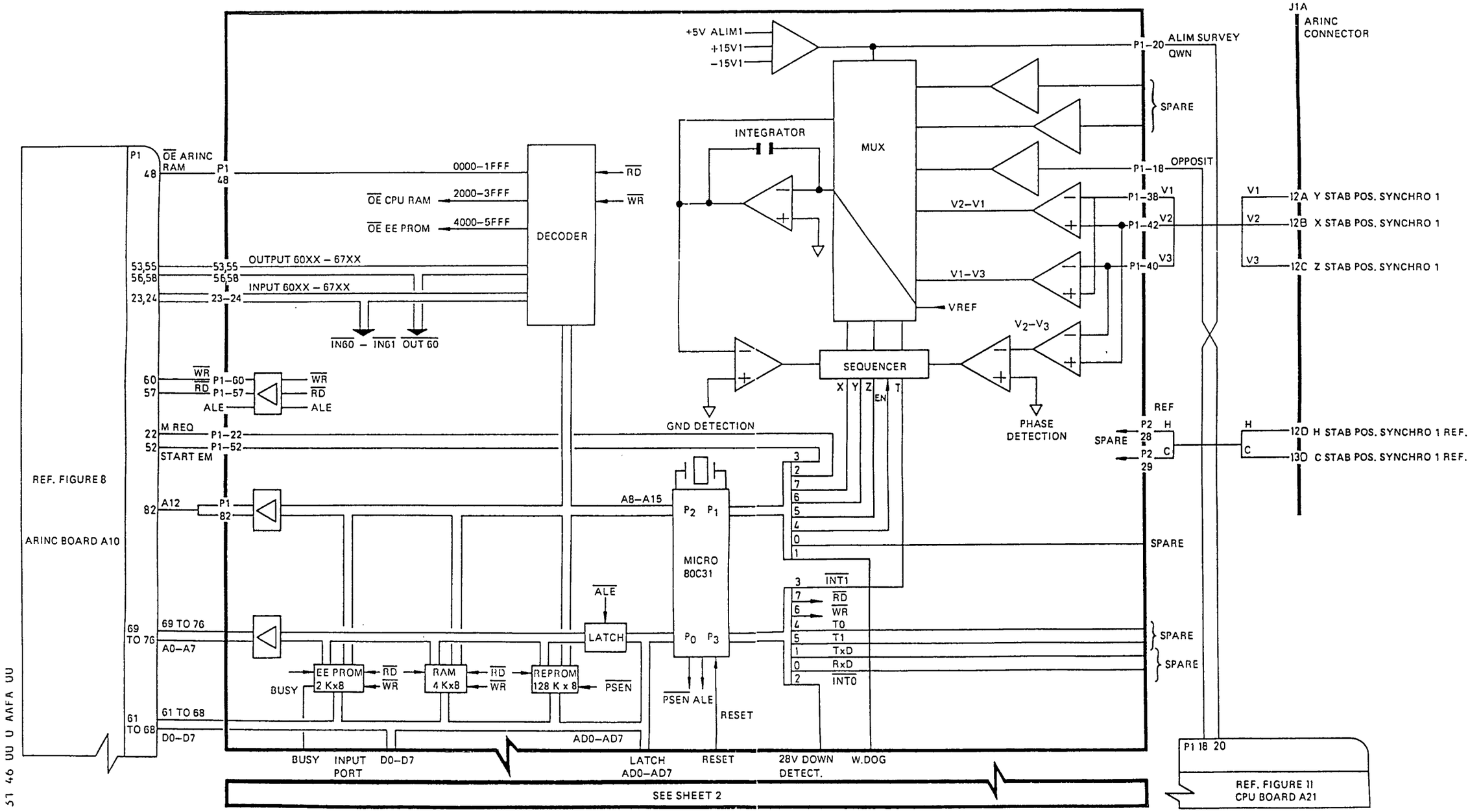
R **ON A/C 001-100,

(Ref. Fig. 011)

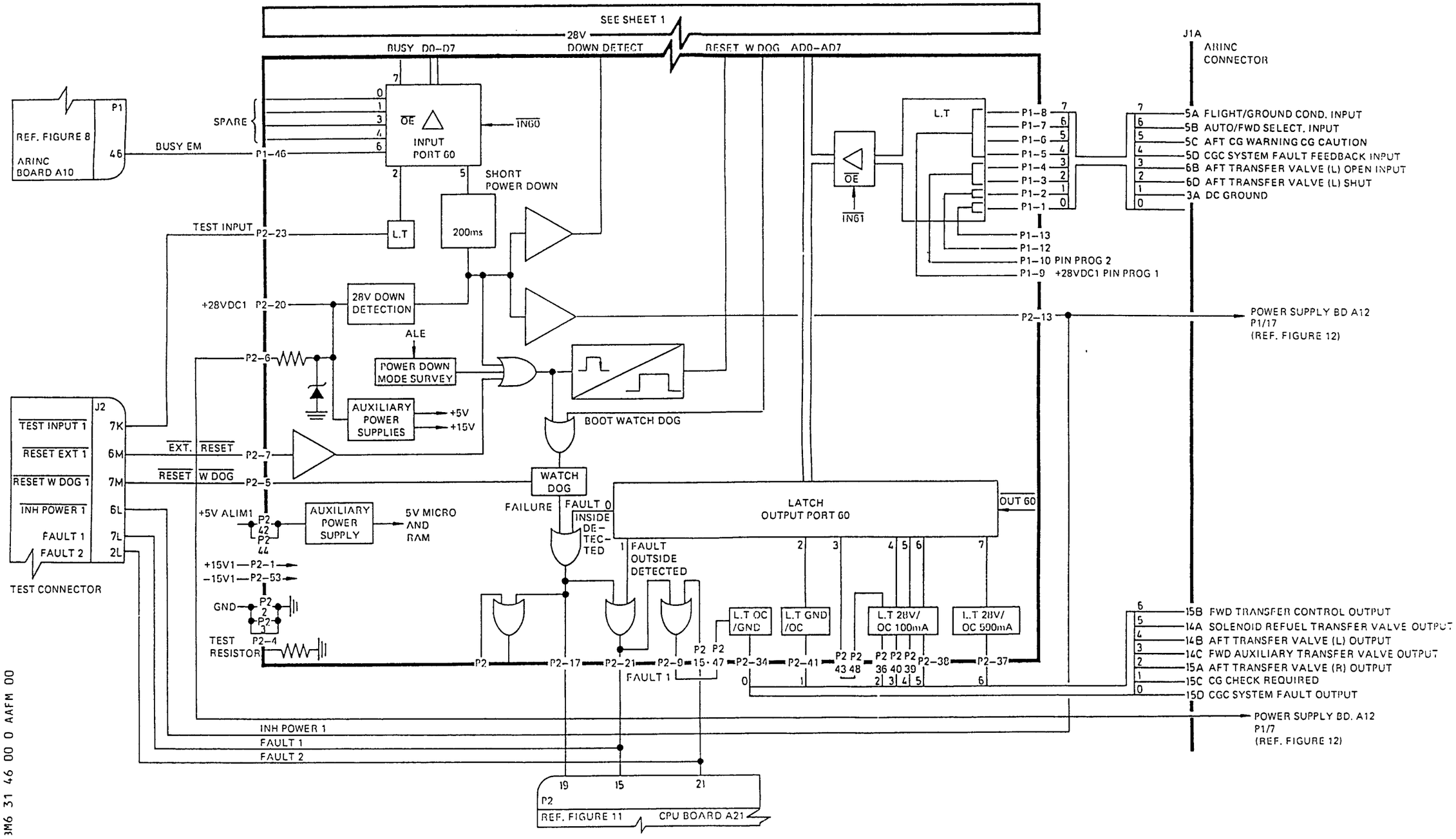
R **ON A/C 001-100,

Each CPU board consists basically of a digital core, an analog-to-digital conversion system and various peripherals, microcontroller, reset circuits, watchdog and control logic.

- The digital core contains:
  . the 8-bit microcontroller (with 128 bytes of protected internal RAM and with two timers)
  . 128 KBytes of EEPROM
  . 6 KBytes of external memory (4 KBytes of protected RAM and 2 KBytes of EEPROM)
  . input/output ports: ports P1 and P3 inside the microcontroller, one external input port (port 60)
  . 16 address lines and a decoder for the external memories, for the input ports (IN60 to 63), for the output port (OUT60) and for the ARINC transmission (OUT61 to 64).
- The analog-to-digital converter transforms the angular data output by the synchro into digital form. The microcontroller timer counts the pulses representing the digital equivalent of the voltage acquired.
- Microcontroller reset circuits: they are activated at power-up by the power-down detection system, by an external reset from the test connector, or by a monitoring system of the power-down mode of the microcontroller.
- In the event of a power failure, the reset system is disabled by the



CPU Board A11 Schematic (Sheet 1 of 2)
Figure 010



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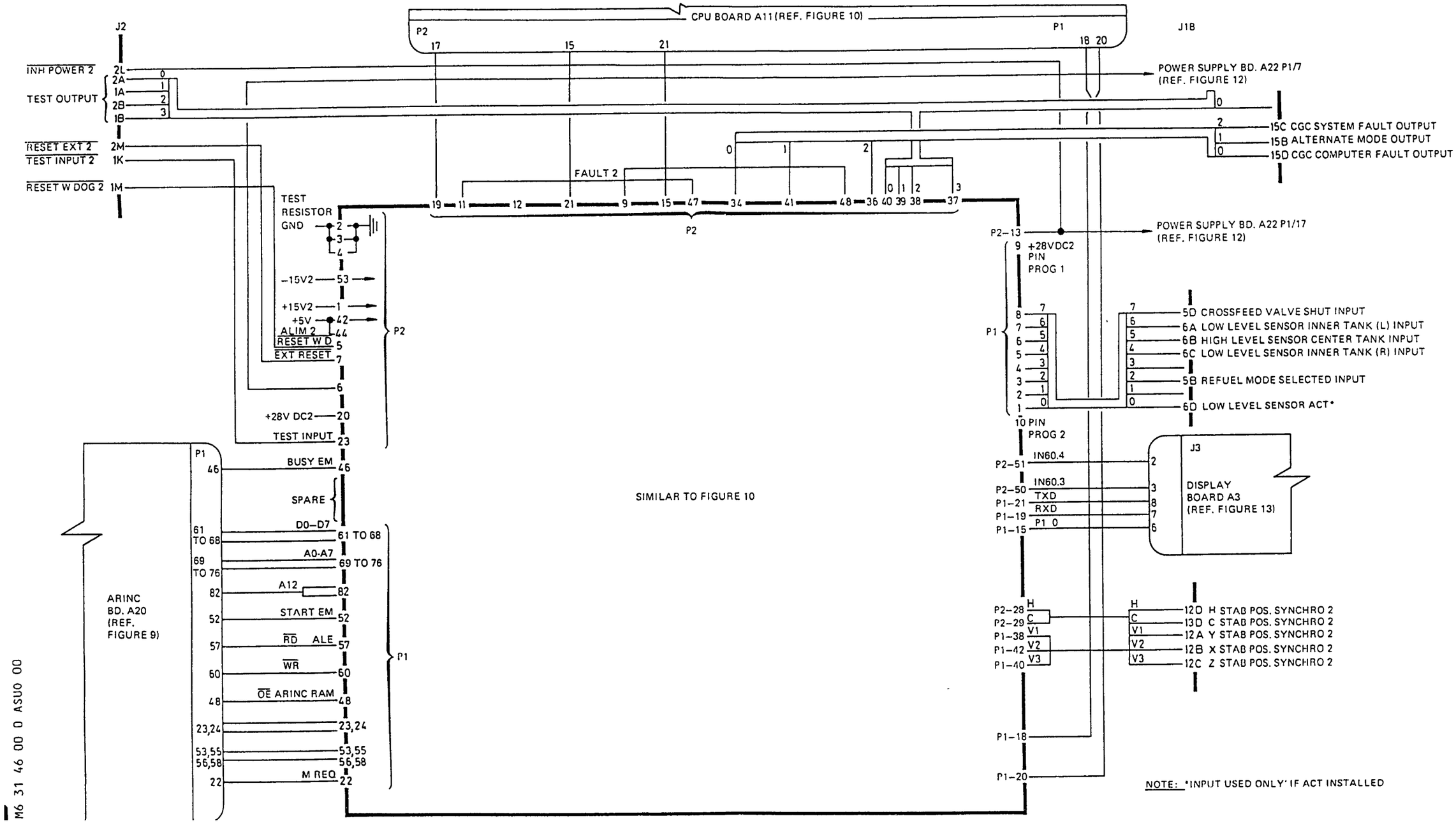
CPU Board A11 Schematic (Sheet 2 of 2)
Figure 010



CPU Board A21 Schematic
Figure 011

power-down detection system in order to allow the microcontroller to put itself into power-down mode.
- Watchdog: the watchdog is rearmed cyclically by the microcontroller (**BOOT WATCH DOG** signal) from the test connector.
  In the event of non-rearming, the watchdog sends fault data to the control logic. The fault data is stored in a flip-flop which is initialized at power-up during operation by an external command (**RESET WATCH DOG** signal) from the test connector.
- Control logic: this generates the fault data to be transmitted to the opposite side and also to the external annunciation.

Each **CPU** board also contains the following power supply and monitoring circuits:
- a separate circuit supplying the microprocessor and the **RAM** which, in the event of a short power-down, holds the voltage in the region of **5 V** for over 200 ms in order to protect the data contained in the **RAM**,
- a standby power supply which provides two voltages to the power-down detection system: **+15 V** for the analog part and **+5 V** for the digital part,
- a circuit for monitoring the **28 V**, which enables the system to survive short power-downs of the **28 V DC** switching the system over to standby and protects the data contained in the **RAM**,
- a global monitoring system for the three supply voltages: **+15 V**, **-15 V** and **+5 V**, the result of which is taken into consideration on both channels by means of the synchro-to-digital converters.

NOTE : CGCC Power Up Test
During power-up, the CGCC checks the CGC SYSTEM FAULT output. For this purpose, the computer sends a signal from the fault output (1GU/AA-15D) to the fault feedback input (1GU/AA-5D). It sets and resets the fault output and checks the signal change on the feedback input.
The power-up test does not run if during the test:
- one or both FWC illuminate the FAULT lamp in pushbutton 3GU on fuel-control panel 430VU,
- the isolation valve control logic illuminates the FAULT lamp,
- the button itself is pushed.

In these cases the CGCC does not enter the normal CG control. It illuminates the FAULT lamps in the pushbuttons 3GU on panels 430VU and 4GU on the maintenance panel 472VU. An availability test or flight history test is not possible under these conditions.

(c)Power Supply Boards

R **ON A/C 001-100,

(Ref. Fig. 012)

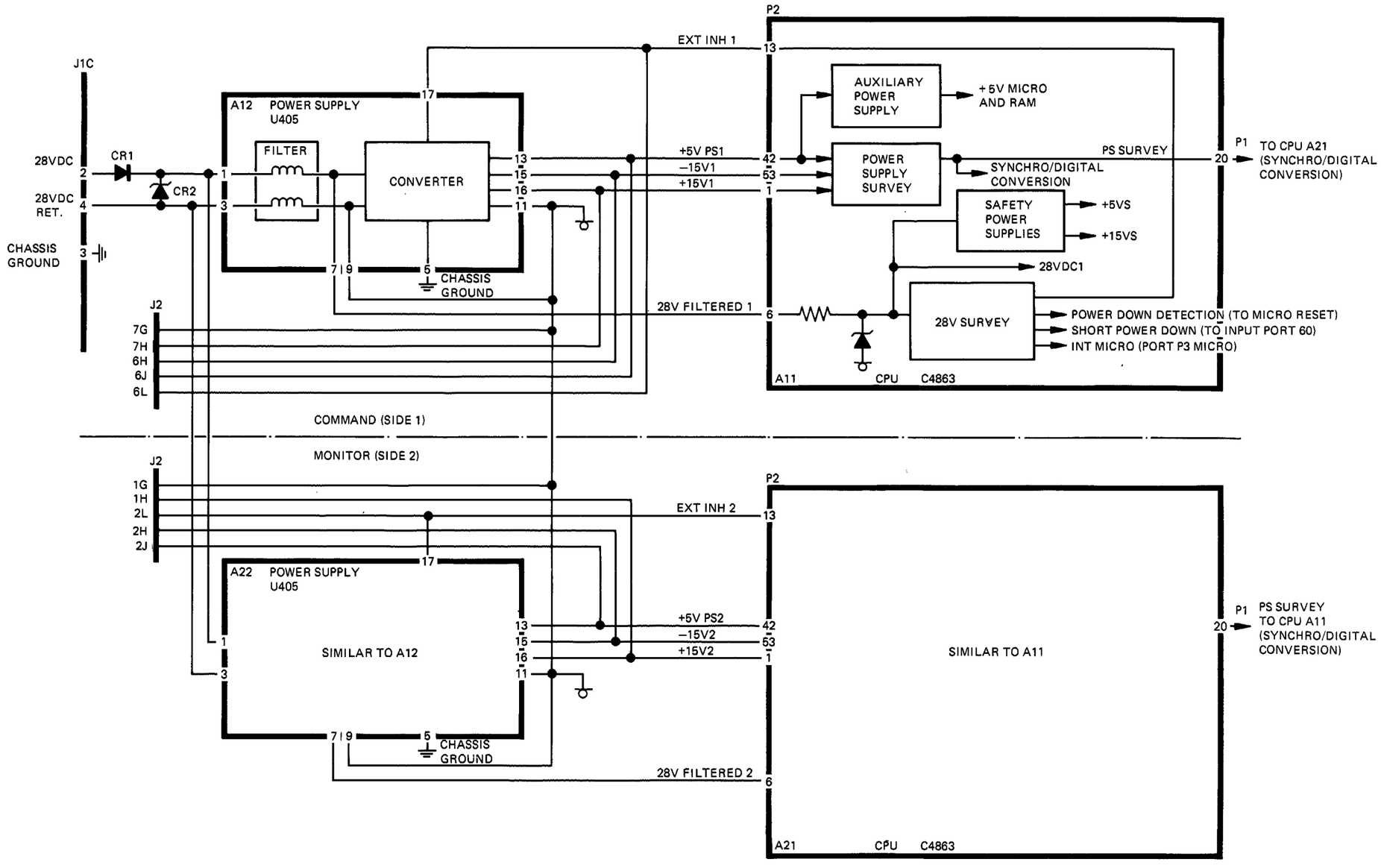
R **ON A/C 001-100,

Each power supply board contains a DC/DC converter which is powered from the aircraft 28 V DC supply via bus 308PP and circuit breaker 2GU or via bus 901PP and circuit breaker 6GU. Both converters provide the necessary voltages of +5 V and ±15 V DC for system operation. The voltages are monitored by circuits on the CPU boards.

(d)Display Board

R **ON A/C 001-100,

(Ref. Fig. 013)
With the aircraft on the ground, a display of faults which occurred during the last or preceding flights and/or the results of a CGCC availability test can be selected and is shown on a display board (BITE display) on the computer front panel. Selection of either display is made by means of the display switch, also located on the computer front panel.
The information to be displayed is transmitted in serial form from the microprocessor of the monitor channel to the display board. It is stored into shift registers and then clocked out in digits and segments via a number of line drivers. The display consists of 8 digits, each with 16 segments, and a character is defined by three bytes (24 bits). Thus, 24 bytes are necessary for the activation of all 8 digits.



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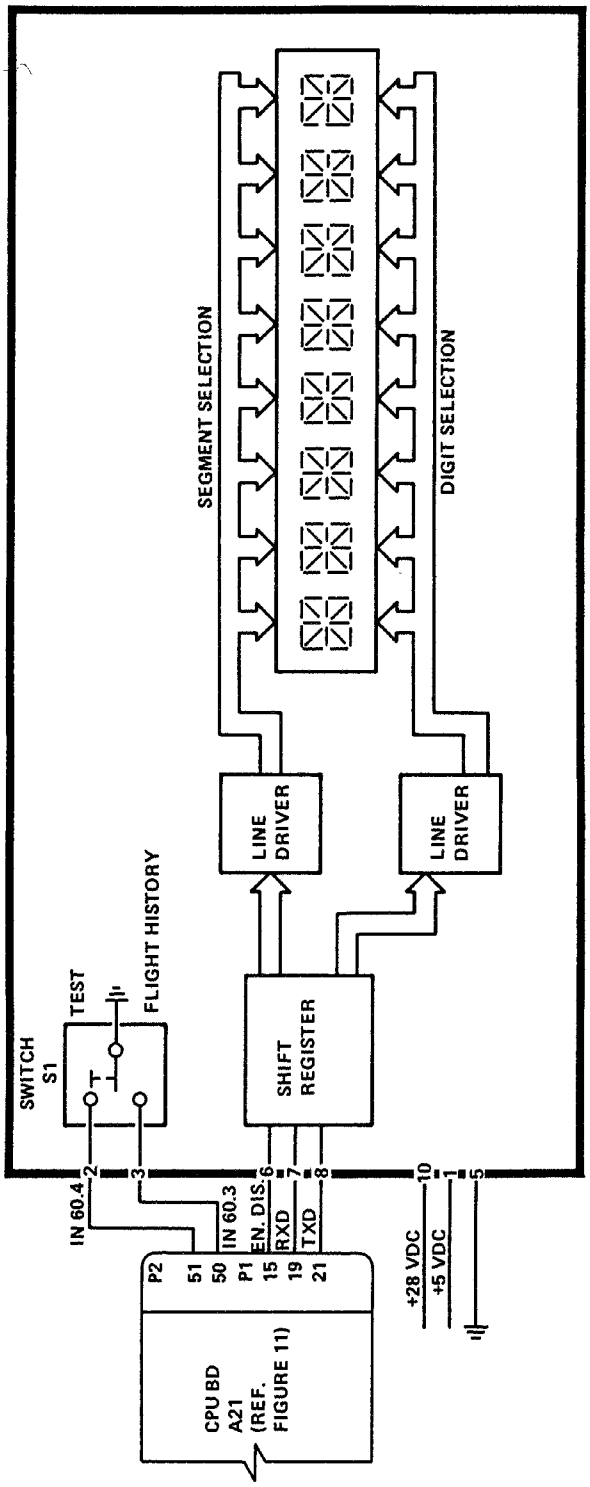
CGCC Power Supply Boards
Figure 012



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Display Board A3 Schematic
Figure 013

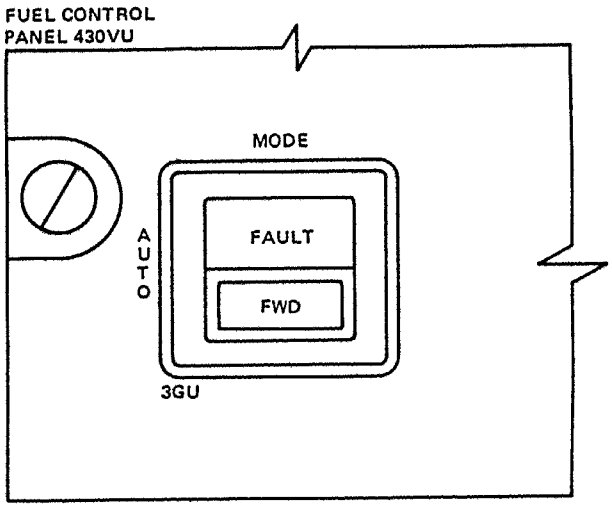
B. TRIM TK MODE Pushbutton (3GU)
(Ref. Fig. 014)

R **ON A/C 001-100,

The TRIM TK MODE pushbutton is an illuminated pushbutton switch indicator located on fuel control panel 430 VU.
The FAULT caption is illuminated amber if the P/BSW is in the AUTO position and if any of the following failurs occur:
- a CGCC fault,
- absence of initial ZFW or ZFCG values after takeoff,
- CG moves aft of target CG (target value plus 0.3 % MAC for flights above FL 205),
- detected transfer system faults during alternate mode 1,
- detected FQI faults during alternate mode 2,
- loss of A/C power (no CGCC fault, only the FAULT caption is illuminated by busbar 901PP),
- failure caused by one of the following manual operations:
  - trim tank pumps switched off or manual FWD transfer commanded during alternate mode,
  - if after an executed manual FWD transfer (system switched back to normal mode) an alternate mode occurs while the CGCC commands an aft transfer.

NOTE : The FAULT caption is also illuminated by a signal from the FWS if both trim tank pumps fail or if the trim tank isolation valve fails to open or if 40.8 % MAC are exceeded.

Should any of the above failures occur, a warning message is displayed on the LH ECAM Display for flight crew information. Besides, a respective failure indication is shown on the FUEL page of the RH ECAM Display.
Manual fuel flow control in the FWD direction is obtained by pressing the switch in. The FWD caption is then illuminated.



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TRIM TK MODE Pushbutton
Figure 014

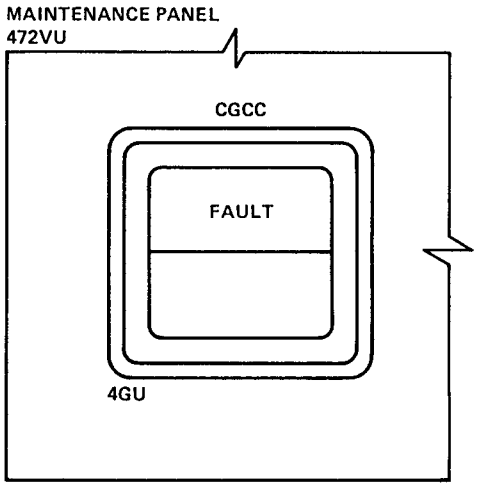
C. FAULT Light (4GU)

R **ON A/C 001-100,

(Ref. Fig. 015)

R **ON A/C 001-100,

The FAULT light is illuminated when a CGCC internal failure has been detected. If indicates that the CGCC should be removed for test and maintenance procedures.
The light is also illuminated if the TRIM TK MODE pushbutton is pressed to FWD during the power up to the CGCC. In this case all digits of the CGCC BITE display are also illuminated.



BM6 31 46 00 0 BAU0 00

FAULT Light
Figure 015

5. System Operation

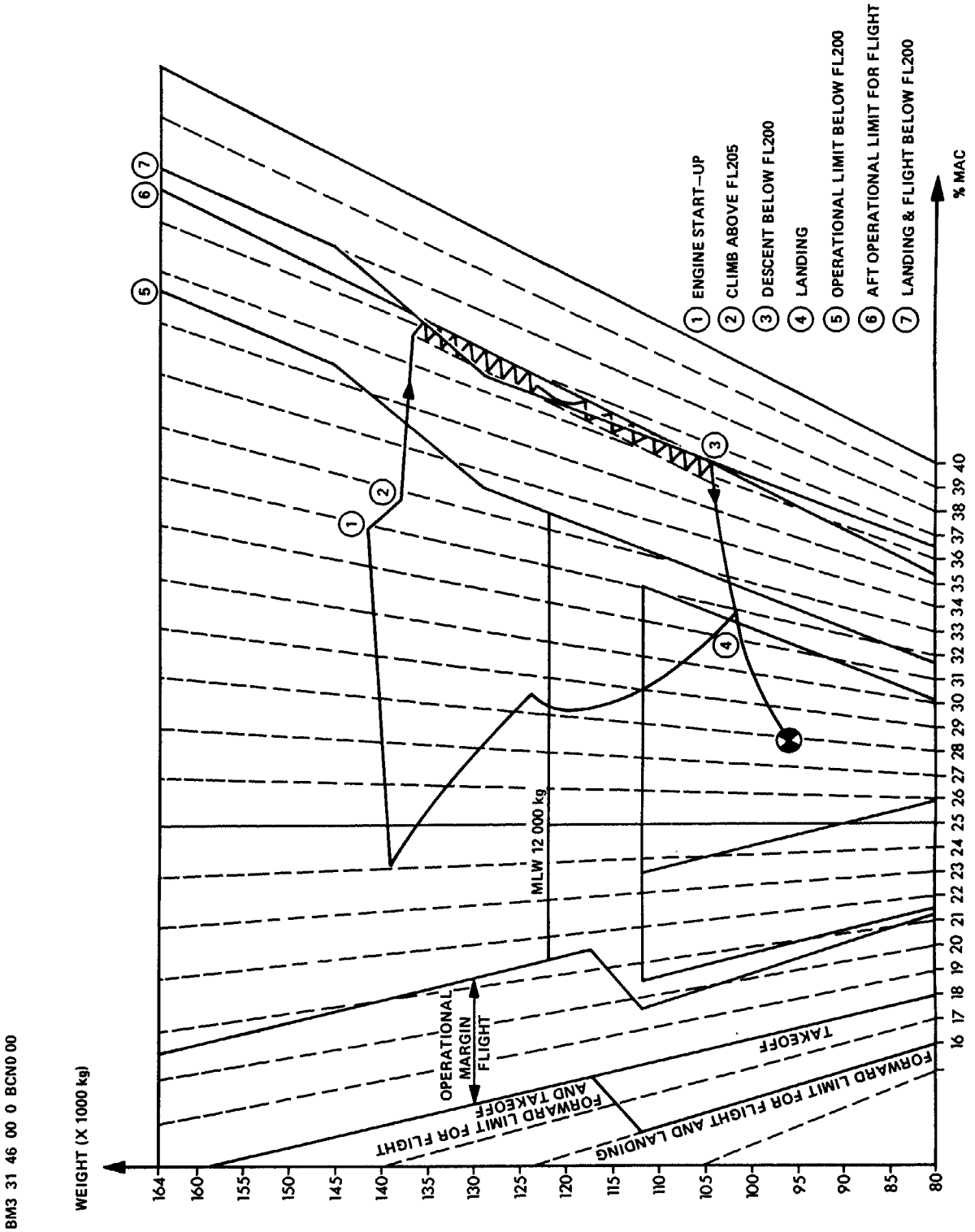
A. Normal Operation

R **ON A/C 001-100,

(Ref. Fig. 016)

R **ON A/C 001-100,

Automatic operation of the CGCS is achieved when either one or both of the TRIM TK PUMP LOPR/OFF switches on the Fuel Control Panel are pressed to the 'in' position and the TRIM TK MODE switch is in the 'out' position. The system is then armed and the valves and pumps of the transfer system will operate from command signals issued by the CGCC command channel to transfer fuel in either the FWD or aft direction in order to obtain the target CG. The CG position is computed from input data received from the FQI computer and from aircraft pitch attitude received from the IRS. The target CG is achieved by the transfer of fuel in the aft direction from the center or inner wing tanks to the trim tank and in the FWD direction from the trim tank to the center tank. The monitor channel of the CGCC monitors the command channel as well as the transfer system to make certain that the CG is always maintained within safe limits even under degraded system performance.
As long as the A/C is on the ground, there is no CG control. The computer accepts the FQI data as well as the primary WBS data or data from the load and trim sheet. Load and trim sheet data which must be input before takeoff on the CDU's of the FMS, to enable the CGCC compute the actual CG location.
The target CG for flight levels below FL 200 is 31.81 % MAC at 80 t to 33.58 % MAC at 128.6 t to 35.41 % MAC at 145 t to 35.5 % MAC at 150 t.
After take-off and with the isolation valve open the CGCC takes care that the target CG for flights below FL 200 is not exceeded.
If the A/C reaches FL 205 the CGCC starts an aft transfer to get the aft target CG.
Above FL 205 the CG is maintained within 0.5 % MAC forward of a target CG of 37.5 % MAC minus CG for 150 t and 35.3 % MAC minus CG for 80 t with linear variation in between by using normal FWD transfer as long as fuel loading allows this.
Delta CG is a safety margin that defines operational limits. The operational limits vary with the airline load and trim sheet procedure. As programmable inputs the airline may select delta CG by the use of CGCC program pins. The selected margin remains constant during the flight for the specific aircraft.
A fast forward transfer is initiated by the CGCC if the target CG is over-


① ENGINE START–UP
② CLIMB ABOVE FL205
③ DESCENT BELOW FL200
④ LANDING
⑤ OPERATIONAL LIMIT BELOW FL200
⑥ AFT OPERATIONAL LIMIT FOR FLIGHT
⑦ LANDING & FLIGHT BELOW FL200
% MAC
MLW 12 000 kg
OPERATIONAL MARGIN FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
TAKEOFF
WEIGHT (X 1000 kg)
BM3 31 46 00 0 BCN0 00

CGCS Normal Operation without ACT
Figure 016

run by more than 0.1% MAC.

NOTE : If the CGCC is not able to acquire a target CG because the trim tank has reached high level, CG control is interrupted and resumed automatically when the target CG is reached by fuel consumption out of the basic tank system.

The Auto Fuel Feed Logic switches over from center to inner tank feeding, if the calibration sensor in the center tank becomes dry during CG control.
The CGCC makes normal FWD transfers in steps of 500 kg. The computer does this when one of the inner tanks is empty and the fuel in the center tank falls to 500 kg until the trim tank is also empty.

The CG control is normally terminated when the A/C passes FL 200 on its descent. Then all remaining trim tank fuel is transferred into the center tank using fast FWD transfer. This transfer is also initiated by the CGCC which takes care that neither the FWD CG limit is exceeded nor the center tank is overfilled.
If power is switched off after refueling or landing, the CGCC is able to enter normal control mode after power-up. The computer therefore stores the validated FQI values after refueling or the monitored fuel quantity values after landing in a nonvolatile memory if the fuel flow decreases below 100 kg/h.
If thereafter the APU is running, the stored fuel quantity values are updated whenever the estimated APU fuel consumption reaches 50 kg until engine start-up.
At the end of a flight the CGCC stays in normal mode when the outer tanks are normally used and the trim tank is empty. It remains also in normal mode if during refueling more than 200 kg are in the trim tank and if the amount of fuel in the outer tanks is below 2500 kg. In all other cases it enters alternate mode when the amount of fuel in the outer tanks decrease below 2.5 t.

B. Alternate Mode

The CGCC uses a so called 'alternate mode' to control the CG when a failure in the transfer or the other related systems leads to degraded system performance. The system distinguishes between two types of failures which will both cause the CGCC to enter the alternate mode.
Type 1 failures:
During type 1 failures the FWD fuel transfer rate is limited to the engine burn rate, because the overfill protection of the center tank based on the FQI data is not possible.

In the present system configuration the only type 1 failure occurs, if the FQI fails.
Type 2 failures:
During type 2 failures the forward transfer control valve and the FWD auxiliary transfer valve are used during forward transfers. Prevention of center tank overfilling is based on FQI center tank indication.
The following failures are classified as type 2 failures:
- solenoid refuel transfer valve fails to open or close,
- FWD transfer control valve fails to open,
- FWD transfer control valve fails to close,
- FWD auxiliary transfer valve fails to open,
- one aft transfer valve fails to close or open,
- both trim tank pumps fail,
- FWD auxiliary transfer valve fails to close.
- both DADC fail,
- both FFI fail (possible only on the ground!)
- AFT CG warning configuration problem,
- AFT CG warning system failure.

NOTE : If the FWD transfer control valve or the auxiliary

transfer valve fail to close, the CGCC opens both transfer valves to inhibit fuel transfer by gravity when no transfer is required.

The failures mentioned above cause the computer to initiate an alternate mode warning on the ECAM Displays. The LH ECAM Display shows the message TRIM TK AFT XFR NOT AVAIL and on the RH ECAM Display a respective change of the FUEL page synoptic is shown. The ECAM shows the alternate mode warnings also on the ground independent of the engine fuel flow. Depending on the failure type and with respect to the ZFCG, the CGCC initiates one of the following transfer procedures:

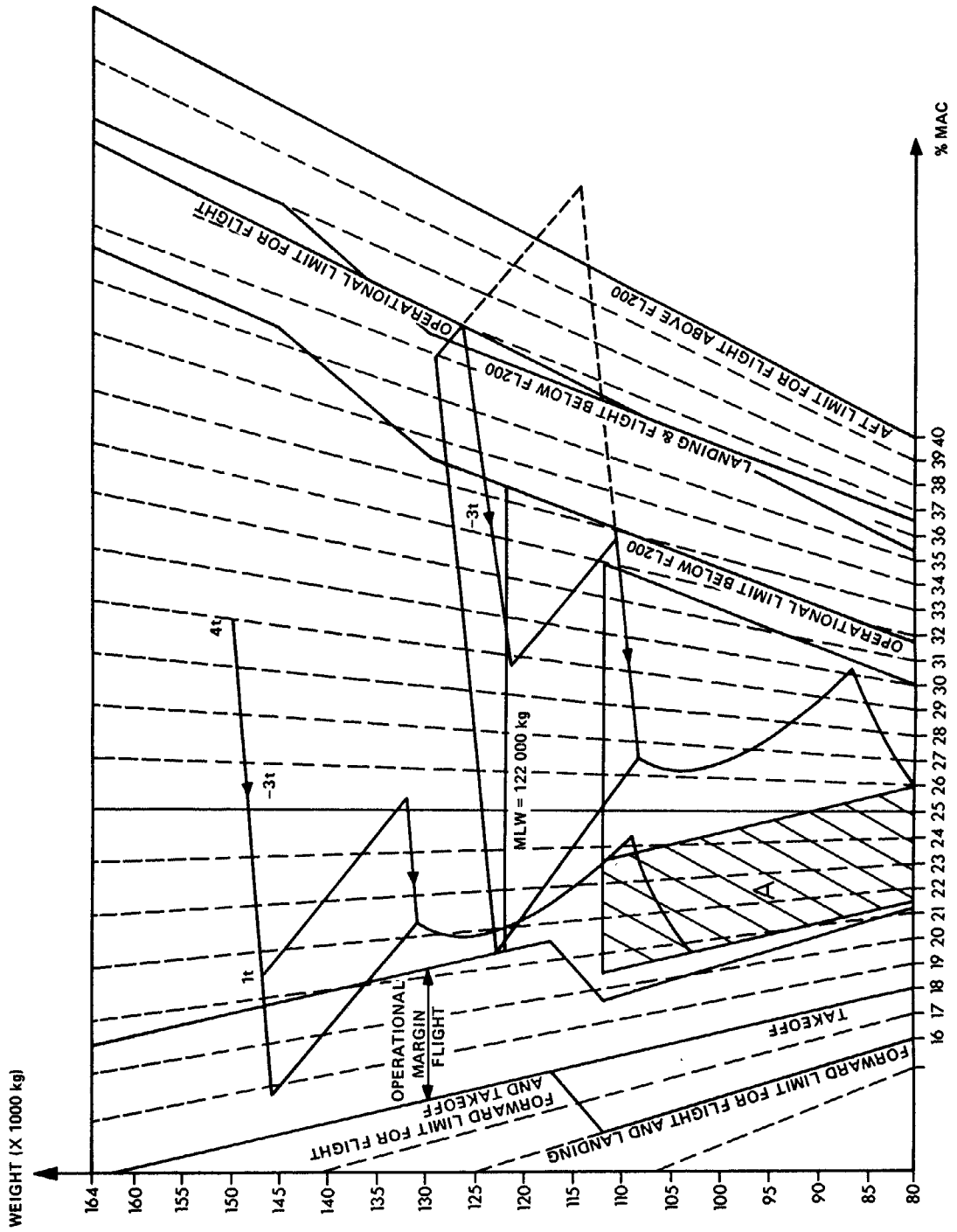
A1 Failure type 1; ZFCG in area 'A'

R **ON A/C 001-100,

(Ref. Fig. 017)

R **ON A/C 001-100,

The CGCC initiates a two-step fuel transfer. During the first step 3 t of fuel are transferred into the center tank when the failure is detected. The fuel quantity determination within the CGCC is based on time. During the FWD transfer the CGCC stops the transfer for two minutes and 45 seconds if the center tank high level sensor gets wet. During the second step, the remaining trim tank fuel is transferred when the center tank is empty. To detect this, the computer uses the pump running signals of the center and inner wing tanks.


% MAC
AFT LIMIT FOR FLIGHT ABOVE FL200
LANDING & FLIGHT BELOW FL200
OPERATIONAL LIMIT FOR FLIGHT
OPERATIONAL LIMIT BELOW FL200
MLW = 122 000 kg
4t
-3t
-3t
1t
OPERATIONAL MARGIN FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
TAKEOFF
WEIGHT (X 1000 kg)
164 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

BM3 31 46 00 0 BEN0 00

Alternate Mode Failure Type A1
Figure 017

A2 Failure type 2; ZFCG in area 'A'

R **ON A/C 001-100,

(Ref. Fig. 018)

R **ON A/C 001-100,

(Ref. Fig. 019)

R **ON A/C 001-100,

(Ref. Fig. 020)

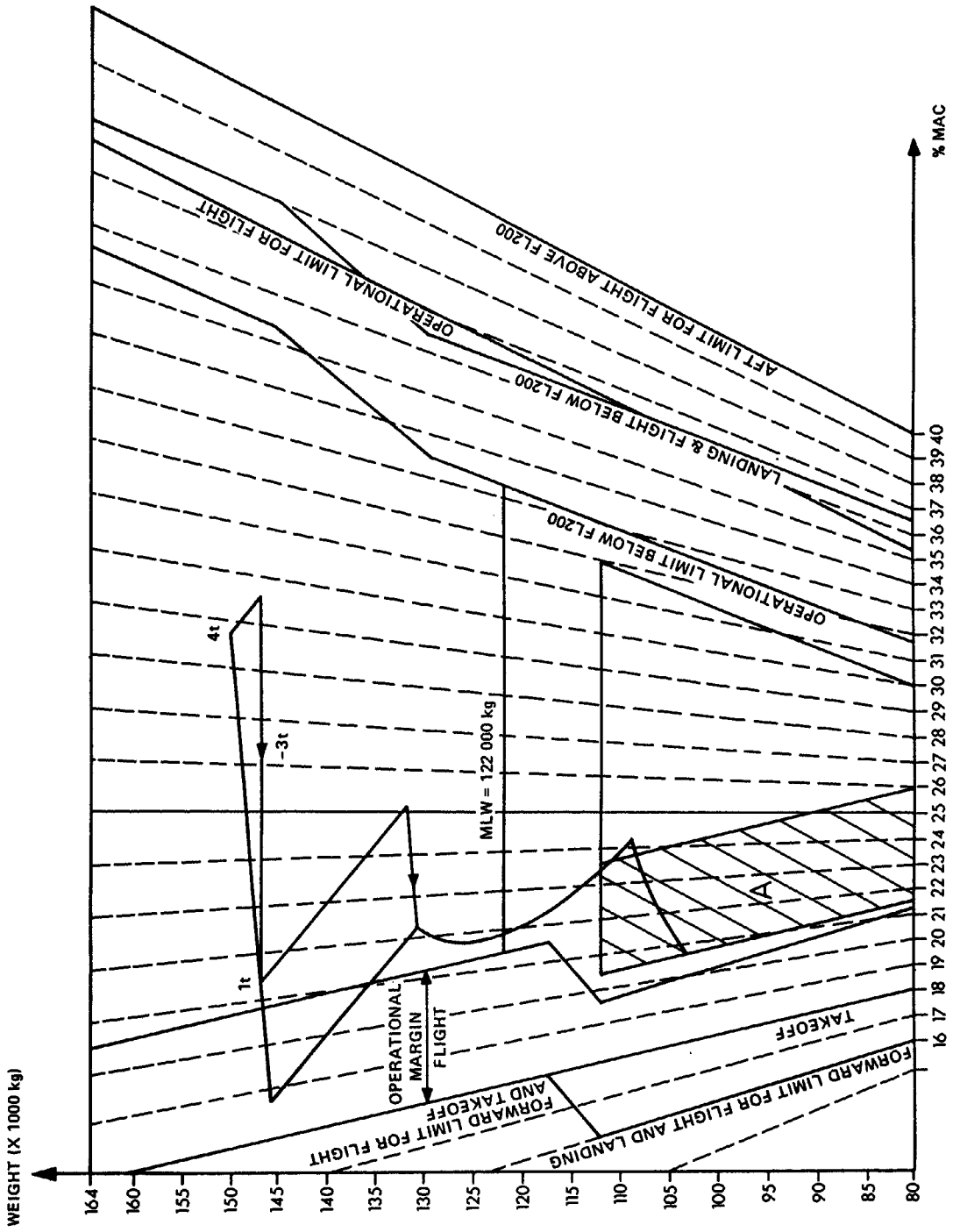
R **ON A/C 001-100,

As for type 1 failures, the CGCC initiates a two-step fuel transfer. For the first step the computer waits until the center tank fuel decreases to 12.4 t, then it transfers 3 t of fuel into the center tank on the base of FQI quantity determination. When the center tank is empty, the remaining trim tank fuel is transferred.

NOTE : If the ZFCG is in area A, there have to be 4 tons minimum of fuel in the trim tank, if the center tank fuel vector is in front of the take off CG limit.
The limitation is necessary in order not to exeed the FWD CG limit under certain conditions in alternate mode of the CGCC.

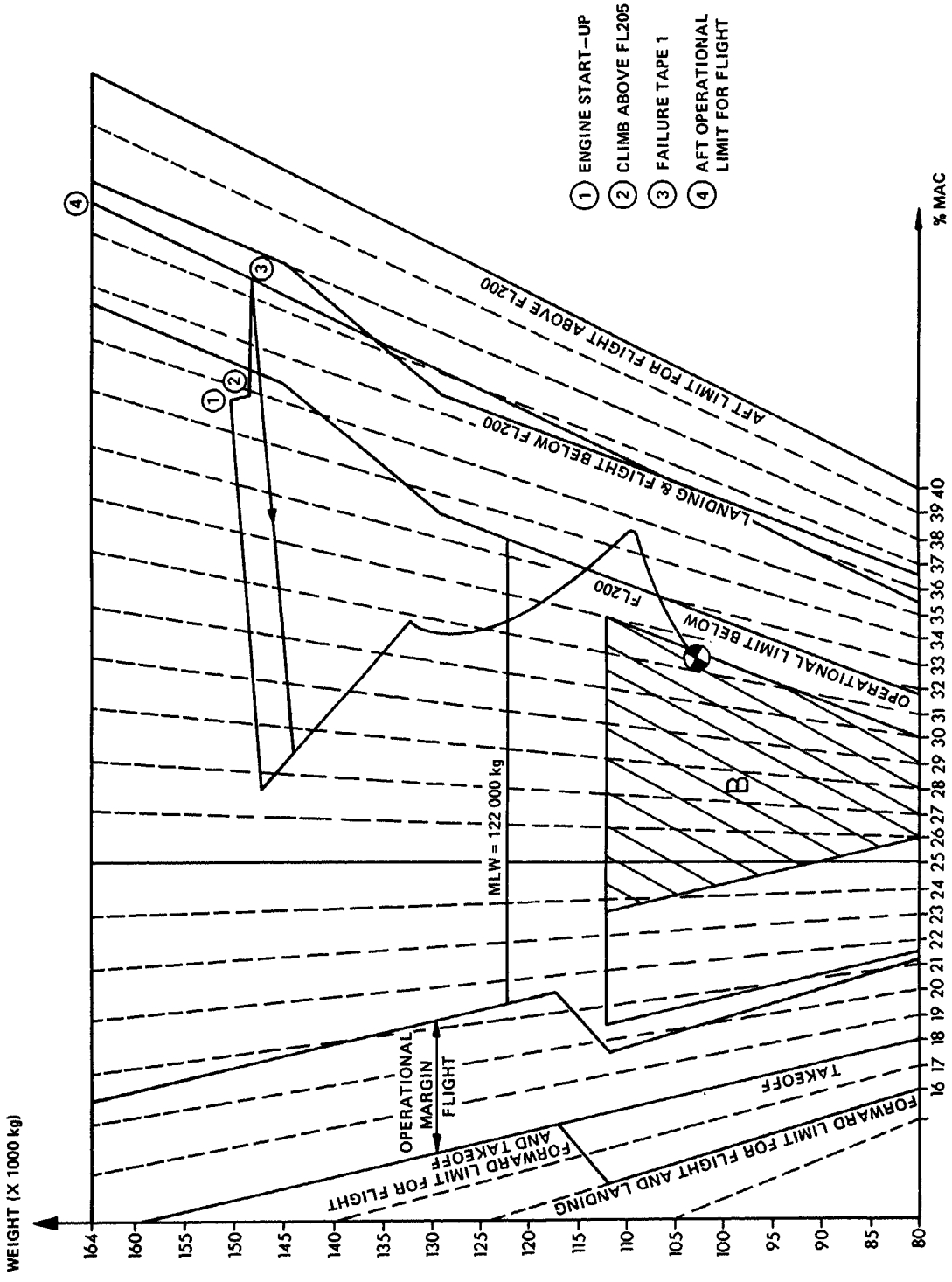
B1 Failure type 1; ZFCG in area 'B' (Ref. Fig. 019)
The CGCC initiates a one step transfer from trim tank to center tank. The transfer starts immediately when the failure is detected. The computer monitors the trim tank fuel decrease as long as no FQI failures are present.

B2 Failure type 2; ZFCG in area 'B' (Ref. Fig. 020)
The transfer is started by the computer when the failure is detected. The fuel is transferred in steps. When the center tank fuel increases to above 15.4 t, the transfer is terminated. Then the computer repeats the fuel transfer every time when the center tank fuel decreases below 14.4 t.


AFT LIMIT FOR FLIGHT ABOVE FL200
OPERATIONAL LIMIT FOR FLIGHT
LANDING & FLIGHT BELOW FL200
OPERATIONAL LIMIT BELOW FL200
4t
-3t
1t
MLW = 122 000 kg
OPERATIONAL MARGIN
FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
WEIGHT (X 1000 kg)
% MAC
164 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

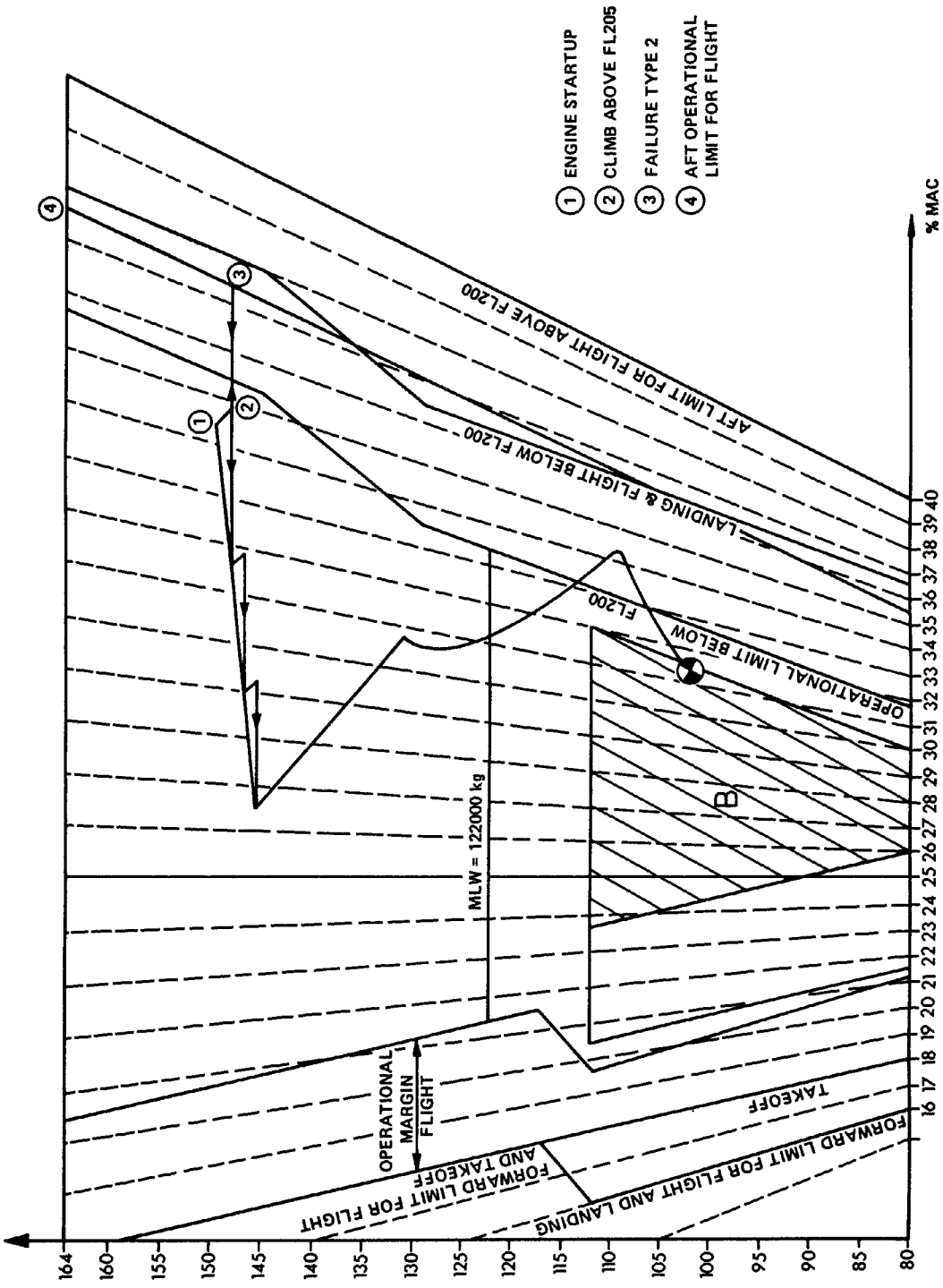
BM3 31 46 00 0 BGN0 00

Alternate Mode Failure Type A2
Figure 018


① ENGINE START-UP
② CLIMB ABOVE FL205
③ FAILURE TAPE 1
④ AFT OPERATIONAL LIMIT FOR FLIGHT
AFT LIMIT FOR FLIGHT ABOVE FL200
LANDING & FLIGHT BELOW FL200
FL200
OPERATIONAL LIMIT BELOW
B
MLW = 122 000 kg
OPERATIONAL MARGIN FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
TAKEOFF
% MAC
WEIGHT (X 1000 kg)
164 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

BM3 31 46 00 0 BJN0 00

Alternate Mode Failure Type B1
Figure 019


① ENGINE STARTUP
② CLIMB ABOVE FL205
③ FAILURE TYPE 2
④ AFT OPERATIONAL LIMIT FOR FLIGHT
AFT LIMIT FOR FLIGHT ABOVE FL200
LANDING @ FLIGHT BELOW FL200
FL200
OPERATIONAL LIMIT BELOW
MLW = 122000 kg
B
OPERATIONAL MARGIN FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
% MAC
WEIGHT (X 1000 kg)
164 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

BM3 31 46 00 0 BLN0 00

Alternate Mode Failure Type B2
Figure 020

The computer automatically re-enters normal mode when the A/C is on the ground and the failure condition is not present any longer.

C. Fault Mode

The CGCS enters the FAULT mode when one of the following failures occurs:
- CGCC failure,
- absence of initial ZFW or ZFCG values after takeoff,
- CG moves aft of target CG (target value for flights above FL 205 plus 0.3 % MAC),
- detected transfer system faults during alternate mode 1,
- detected FQI faults during alternate mode 2,
- failure caused by one of the following manual operations during an alternate mode in flight:
  - trim tank pumps switched off,
  - manual FWD transfer command

If the failure is not a detected computer fault the CGCC stops any fuel transfer. It activates the FAULT lamp on the fuel control panel and sends a warning message to the ECAM displays.
The LH ECAM Display shows then the message TRIM TK SYS FAULT and the RH ECAM Display shows a respective change on the FUEL page synoptic.
In case of a computer failure, the CGCC FAULT lamp on the Maintenance Panel is also activated. CGCS- and CGCC faults which occur during flight are stored in the BITE memory of the computer for read-out by maintenance personel by means of a status history test.
If the fault on the ground is still effective, a message is shown during an availability test.
On the ground the fault mode disappears automatically if the fault condition is no longer present.
The CGCC will also enter the fault mode during power-up, if the FAULT lamp on the overhead panel is already illuminated by the FWC or the isolation valve control logic.
It does the same if the TRIM TK MODE P/B was operated to the "in" position and was not released before a new power-up. However the CGCC goes into the computer fault mode if this occurs. It illuminates the FAULT lamps on the maintenance and the overhead panel as well as all digits on the CGCC BITE display. The CGCC display will only reenter the normal mode, if the FAULT lamp on the overhead panel is not longer illuminated by the systems mentioned before or if the TRIM TK MODE P/B has released to AUTO.

To enter the normal mode a circuit breaker recycling for 2GU (FUEL TRIM TANK FWD XFR CGCC) on panel 22VU is necessary. These faults mentioned before will not leave a message in the CGCC BITE.

NOTE : The CGCS does not enter the FAULT mode under the subsequent circumstances:
- The actual A/C CG can temporary exceed the aft target CG caused by level changes above FL 205. In this case a delay logic inhibits the FAULT mode.
- A manual FWD transfer is possible on the ground in alternate mode.
- The actual A/C CG exceeds the AFT target CG by 0.1% MAC. The CGCC starts in this case a fast forward transfer. If the actual CG does not get to a position less than 0.3% MAC AFT within 120 seconds,the computer will go into its fault mode.

D. Manual Mode

The Center of Gravity Control System may be overridden by the crew.
To initiate a FWD transfer the TRIM TK MODE pushbutton must be in the 'in' position and the trim tank pumps must be selected by means of the TRIM TK PUMP pushbuttons on the Fuel Control Panel. The transfer control valve and the auxiliary transfer valve open and fuel is transferred into the center tank independently from any CGCC commands and from center tank high level signals. The forward transfer is indicated by illuminating the FWD caption of the TRIM TK MODE pushbutton. If a pump has been selected and is not delivering the correct pressure, the LOPR caption in the respective pushbutton is illuminated.
To stop any transfer, both TRIM TK PUMP pushbuttons must be selected off and the TRIM TK MODE pushbutton must be in AUTO.
All CGCC commands are then disabled and the pumps stop. The off state is indicated by the OFF caption of the respective button and on the LH ECAM display.
The CGCC will resume its CG control function if at least one TRIM TK PUMP pushbutton is selected on. If the trim tank contains fuel at re-initialization, the monitor thresholds of center and trim tank are extended (see 5.B) and the target CG above and below FL 205 is reduced by 1.5% MAC (see para. 3.A.). The thresholds remain unchanged if the trim tank low level sensor is dry and the FQI indicates trim tank empty.

R **ON A/C 001-100,

6. Test (Ref. Fig. 007, 013)

A. Test Facilities
A bite test of the CGCC itself and its related systems as well as a flight history test of the current status and the last five flights is possible with the A/C on the ground. For these tasks the computer is provided with a BITE-system consisting of:
- failure monitor circuits with appropriate BITE-software,
- eight-digit BITE-display for sequential read-out of detected faults,
- spring-loaded display-switch for selection of availability test or flight history test,
- non-volatile memory for the storage of failures, detected during a flight, for later read-out by means of the flight history test.

During the availability test, faults in peripheral devices are shown on LRU level. During a flight history test the non-volatile memory is checked for failures, stored by the CGCC Monitor to show the CURRENT STATUS, the LAST FLIGHT or the preceding four flights.

NOTE : The count of flight legs for the flight history is incremented by one every first time the engine fuel flow exceeds 100 kg/h between engines start-up and engines shut-down, even though the engines may have been used for ground operations only.

The test results are formed into messages and displayed on the BITE-display. The messages are shown in alphanumerical form and in a sequential order shifting from right to left on the eight-digit BITE-display. In general a message contains the flight number, a failure number and a failure message or, if no failure is detected, a no-failure message. The availability test and the flight history test must be executed when the CGCC is replaced. See therefore chapter 31-46-00, P. Block 501. Operational Test.

NOTE : Besides the facilities mentioned before, the CGCC has the provision for Automatic Test Equipment (ATE) used in bench maintenance of the computer itself. For this the internal circuit functions are connected to an ATE connector on the front of the CGCC. With the help of the Automatic Test Equipment an acceptance test of the CGCC may be executed. During these tests the computer inputs are provided with test data and the outputs are checked for proper output conditions.

B. Flight History Test
A maximum of 16 failures for each of the different flights may be stored

in the non-volatile memory of the CGCC. A new flight begins for the CGCC always one minute after engines shut-down on the ground.
The first failure condition which leads to an alternate mode type 1 and/or alternate mode type 2 and/or to a fault mode is kept in the nonvolatily memory, if the aircraft is in flight.

NOTE : If an engine fuel flow of 100 kg/h is exceeded between engines start-up and engines shut-down, even though for ground operations only, the count of flight legs for the flight history is incremented one minute after engines shut-down.

The flight history test is executed by pressing the display switch on the CGCC to the FLIGHT HISTORY position. The flights are selected as follows:
- one time for the CURRENT STATUS,
- once again before 4 seconds have elapsed for the LAST FLIGHT,
- once again before 4 seconds have elapsed for FLIGHT-1,
- once again before 4 seconds have elapsed for FLIGHT-2,
- once again before 4 seconds have elapsed for FLIGHT-3,
- once again before 4 seconds have elapsed for FLIGHT-4.

A return to the CURRENT STATUS is achieved by waiting more than 4 seconds before pressing the switch again.
The definition of a flight history test message is as follows:
flight number, failure number, failure message;
failure number, failure message;
.....etc.;
end.

The flight numbers are:	The failure numbers are:
CURRENT STATUS,	01 for the 1st failure,
LAST FLIGHT,	02 for the 2nd failure,
FLIGHT-1,	....etc.,
FLIGHT-2,	16 for the last failure
FLIGHT-3,	
FLIGHT-4.	

When no failure is detected, the following is displayed:
flight number, NO FAILURE END.

NOTE : - Selection of the last flight causes the CGCC to display the failures which occured before the last engine shut-down.
- Selection of any other flight causes the CGCC to display the failures which occured during these flights.
- A new flight begins always 60 s after a shut-down of both engines.

C. Availability Test
During this test the present system status is indicated by taking failure snapshots with the help of the CGCC monitor channel.
The test is executed by pressing the display switch on the CGCC to the TEST position. Every time when TEST is selected, a snapshot is taken and

a test message is displayed. The definition of an availability test message is as follows:
failure number, failure message;
failure number, failure message;
....etc.;
end.
The failure numbers are the same as for the flight history test:
01 for the 1st failure,
02 for the 2nd failure,
...etc.,
16 for the last failure.
When no failure is detected, the following is displayed:
NO FAILURE END.

D. BITE Philosophy

R **ON A/C 001-100,

(Ref. Fig. 021)

R **ON A/C 001-100,

The figure shows how the **BITE** works.

(1)Aircraft on the ground

If a new flight has been started the **BITE** can detect an alternate mode 1 or 2 or a fault mode. It does this as long as a cause for one of these modes is present. The different modes and their causes are indicated as follows:

- The actual failure conditions are shown during the availability test.
- Failures which occured on the flight before are shown under **LAST FLIGHT** of the flight history test. Shown is only the first alternate mode 1, alternate mode 2 or fault mode condition.

NOTE : Fault messages are shown under **FLIGHT -1** after the use of the engines even for ground operations only, if the fuel flow exceeded 100 kg/h during these operations.

- Alternate 2 and fault conditions, which occur after landing are only shown during the availability test as long as they are present. They are kept in the nonvolatile memory after take off, if the failure condition still persists. They are then shown under **LAST FLIGHT** of the flight history test.

(2)Aircraft in flight

FAILURE OCCURENCE		BITE MESSAGES VISIBLE ON		
		AVAILABILITY TEST	FLIGHT HISTORY TEST	
ON LAST FLIGHT	ON GROUND		LAST FLIGHT	CURRENT STATUS
ALT1 AND/OR ALT2 AND/OR FAULT	—	—	—	THE FIRST CAUSE WHICH LED TO AN ALTERNATE MODE 1 AND/OR ALTERNATE MODE 2 AND/OR A FAULT MODE IS RECORDED
—	ALT1 AND/OR ALT2 AND/OR FAULT	ALT1 AND/OR ALT2 AND/OR FAULT	—	—

BM6 31 46 00 0 BQU0 00

BITE Philosophy
Figure 021

In flight the first alternate mode 1, alternate mode 2 or fault mode condition which appears is kept in the nonvolatile memory. This is done if the condition is still present after take off or if this condition appears in flight.
If one of the conditions mentioned before disappears after landing but the **CGCC** remains in alternate - or fault mode the message **REFER LAST FLIGHT** is shown in the availability test.
The failures are then shown under **LAST FLIGHT** of the flight history test.
The failures are shown during an availability test, if they are still present on the ground after landing.

E. CGCC Messages
The failure messages for the flight history test and the availability test are equal.

R **ON A/C 001-100,

MESSAGE	MESSAGE LIST REFERENCE	MEANING
CGCC	6.F.(2)(a)	Center of Gravity Control Computer
FQIS	6.G.(1)(a)	Fuel Quantity Indication System
WBS1	6.J.(3)	Weight and Balance System 1
WBS2	6.J.(3)	Weight and Balance System 2
NO DATA WBS1	6.J(3)	
NO DATA WBS2	6.J.(3)	
NO DATA FMS/WBS	6.F.(1)(a)	No initial ZFW and ZFCG
FMS1	6.J.(1)	Flight Management System 1
NO DATA FMS1	6.J.(2)	
FMS2	6.J.(1)	Flight Management System 2
NO DATA FMS2	6.J.(2)	
NO DATA FMS1-2	6.J.(2)	
DADS1	6.J.(9)	Digital Air Data System 1
NO DATA DADS1	6.J.(10)	
DADS2	6.J.(9)	Digital Air Data System 2
NO DATA DADS2	6.J.(10)	
DADS1-2	6.G.(2)(j)	
IRS1	6.I.(1)/6.J.(4)	Inertial Reference System 1
NO DATA IRS1	6.J.(5)	
IRS2	6.I.(1)/6.J.(4)	Inertial Reference System 2
NO DATA IRS2	6.J.(5)	
NO DATA IRS1-2	6.J.(6)	
FFML	6.J.(7)	Fuel Flow Meter Left
NO DATA FFML	6.J.(8)	
FFMR	6.J.(7)	Fuel Flow Meter Right
NO DATA FFMR	6.J.(8)	
FFML-R	6.G.(2)(k)	
TRIM TK HIGH/CALB SENSORS	6.H.(1)	
TRIM TK LOW/CALIB SENSORS	6.H.(2)	Sensor signals
AFT CG WARN CONFIG	6.G.(2)(a)	Discrete from FWS
AFT CG WARN INOP	6.G.(2)(b)	
REFUEL/XFR VALVE	6.G.(2)(c)	|
FWD XFR CONTROL VALVE	6.G.(2)(d)	|
FWD AUX XFR VALVE	6.G.(2)(e)	> Status of valves
AFT XFR VALVE LEFT	6.G.(2)(f)	|
AFT XFR VALVE RIGHT	6.G.(2)(g)	|
TRIM TK PUMP 1-2	6.G.(2)(h)	Pumps switched off or Low Pressure Indication
TRIM TK PUMP CONTROL	6.F.(1)(c)	Switches on Cockpit Fuel Control Panel

MESSAGE	MESSAGE LIST REFERENCE	MEANING
FLIGHT/GROUND SWITCH	6.K.(1)	Landing gear relay or CGCC
AUTO/FWD SELECT	6.F.(1)(d)	Switch on Cockpit Fuel Control Panel
TARGET EXCEEDED	6.F.(1)(b)	A/C CG behind target CG
NO FAILURE		No failure detected
END		End of a message

R **ON A/C 001-100,

F. Fault Mode Messages

There are two different fault modes:
- CGCS fault
- CGCC fault

The CGCS fault is a failure detected within the CGCS or in the related systems and does also cover the CGCC itself.
The CGCC fault is a failure detected in the CGCC itself. In this case it is necessary to replace the computer when the aircraft is on the ground. In both failure cases the crew must empty the trim tank with the help of a manual forward transfer.

(1)CGCS System Fault

The LH ECAM display shows the message TRIM TK SYS FAULT. To see the message on the ground it is necessary to switch on at least one trim tank pump. On the overhead panel the FAULT caption of the TRIM TK MODE pushbutton comes on.
The fault mode is latched if it occurs in flight. On the ground and after engine shut-down the failures are shown under LAST FLIGHT of the flight history test.
The fault mode is not latched if it occurs on the ground. It disappears automatically if the cause disappears. Failures are only shown during an availability test as long as the failure is present.

(a)Message NO DATA FMS/WBS

The CGCC has not received the initial ZFW and ZFCG values either from the FMS or from the WBS.
The failure does not lead to a fault mode if it occurs on the ground. The message is then only shown during an availability test. It leads to a fault mode, if the CGCC gets no initial ZFW and ZFCG in flight. The failure is then kept in the nonvolatile memory.
The following maintenance actions are necessary if ZFW and ZFCG were inserted by the crew:
- Check of the FMS1 and the FMS2.
- Check of the WBS1 and the WBS2, if installed.

- Check of the aircraft wiring between the CGCC and the FMS or the WBS.
- Check of the CGCC.

(b)Message TARGET EXCEEDED

The CGCC keeps the message in its nonvolatile memory, if during flights the aircraft CG is more than 0.3 % MAC behind the target CG, which is valid for flights above FL205.

The following maintenance actions are necessary:

- Check of the fuel system.
- Check of the CGCC.

(c)Message TRIM TK PUMP CONTROL

If the TRIM TK PUMP pushbuttons fail or are switched OFF and an alternate mode follows, the CGCC goes from normal operation into the fault mode.

The fault mode is also entered if the TRIM TK PUMP P/B fail or are pressed during an alternate mode.

The following maintenance actions are necessary if the crew did not switch off the TRIM TK PUMP pushbuttons:

- Check of the TRIM TK PUMP pushbutton.
- Check of the aircraft wiring.
- Check of the CGCC.

(d)Message AUTO/FWD SELECT

If the TRIM TK MODE pushbuttons fails or is pressed and an alternate mode follows, the CGCC goes from normal operation into the fault mode.

The fault mode is also entered if the TRIM TK MODE P/B fails or is pressed during an alternate mode.

The following maintenance actions are necessary if the crew did not press the TRIM TK MODE pushbutton:

- Check of the TRIM TK MODE pushbutton.
- Check of the aircraft wiring.
- Check of the CGCC.

(2)CGCC Computer Fault

A computer fault is also indicated on the LH ECAM display and by the FAULT caption of the TRIM TK MODE pushbutton on the fuel control panel. Also, the fault is indicated by the FAULT light on the maintenance panel if the panel is switched on.

A computer fault does not stop the CG control. The pilots have to follow the same procedure which applies to CGCS faults.

A message is stored if the failure occurs in flight. It is shown during a flight history test.

The message is also shown during an availability test if the failure occurs on the ground and as long as the failure is present.

(a)Message CGCC

The subsequent possibilities lead also to this message:

- Interruption of the 26 V/400 Hz voltage derived by the stabilizer synchro transmitter.
- Interruption of one of the internal CGCC power supplies.
- No reception of the equipment identifier label 377 neither on the command nor on the monitor side of the CGCC.

The first two possibilities are not latched by the CGCC. If the failure disappears, the computer leaves the fault mode.

The message is stored if the failure occurs in flight.
The following maintenance actions are necessary:
- Check of the synchro transmitter voltage.
- Check of the CGCC.

R **ON A/C 001-100,

G. Alternate Mode Messages

(1)Alternate Mode Type 1

The LH ECAM display shows the warning AFT XFR NOT AVAIL. On the FUEL page of the RH ECAM display the GW and CG are shown in amber or are crossed if the FQI computer is involved.
The messages are displayed during an availability test if the failure is still pending or during a flight history read-out, if the failure occured in flight.

(a)Message FQIS

The CGCC checks the sign status matrix (SSM) of the data word containing the tank contents. The word is transmitted by the FQI computer. The CGCC enters the alternate mode if the SSM of the FQIC contains no computed data (NCD), failure warning (FW) or functional test (FT) data for more than 60 seconds. The computer stores this event in its nonvolatile memory and sends the ALTERNATE MODE discrete the FWS. For this the CG and the GW on the RH ECAM display are crossed and shown in amber. The display shows the actual GW and CG again if the FQIC sends valid data again.
On the ground, the alternate mode is automatically reset if the FQI computer transmits Normal Operation (NO) on its Sign Status Matrix (SSM). This auto-reset is only possible, if there is no descrepancy between the FQI indication and the CGCC monitor.
The following maintenance action is necessary:
- Check of the FQI computer.

(2)Alternate Mode Typ 2

The LH ECAM display shows the message AFT XFR NOT AVAIL. The CG and GW are shown on the RH ECAM display in amber. They are not crossed.
During this alternate mode of operation the fuel at transfer function is inhibited for the remaining flight leg and the TRIM TANK AFT XFER NOT AVAIL message is permanently displayed on the LH ECAM.
The CG and the GW are displayed on the RH ECAM in amber.
The warning on the LH ECAM display disappears when the aircraft is on the ground and the failure condition is eliminated.

(a)Message AFT CG WARN CONFIG

The CGCC receives a signal from the FWS that an AFT CG warning configuration problem exists and causes this message.
The following maintenance actions are necessary:
- Check of the FWS and the connected AFT CG warning system.

(b)Message AFT CG WARN INOP

The CGCC receives a signal from the FWS that an AFT CG warning

system failure exists and causes this message.
The following maintenance actions are necessary:
- Check of the FWS and the connected AFT CG warning system.

(c)Message REFUEL/XFR VALVE
The CGCC continuously compares the solenoid valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the solenoid valve 70QU and relay 72QU in the trim tank.
- Check of the CGCC discrete input and output for the solenoid valve.

(d)Message FWD XFR CONTROL VALVE
The CGCC continuously compares the valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the FWD transfer control valve 16QL in the main refuel gallery.
- Check of the CGCC discrete input and output for the valve.

(e)Message FWD AUX XFR VALVE
The CGCC continuously compares the valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the FWD auxiliary transfer valve 15QL in the main refuel gallery.
- Check of the CGCC discrete input and output for the valve.

(f)Message AFT XFR VALVE LEFT
The CGCC continuously compares the valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the aft transfer valve left 17QL in the main refuel gallery.
- Check of the CGCC discrete input and output for the valve.

(g)Message AFT XFR VALVE RIGHT
The CGCC continuously compares the valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the aft transfer valve right 18QL in the main refuel gallery.
- Check of the CGCC discrete input and output for the valve.

(h)Message TRIM TK PUMP 1-2
The message is given if both trim tank pumps are switched off or LO PR is indicated on both pump switches and if the CGCC wants to perform a FWD transfer from the trim tank to the center tank. In this case the computer goes into the alternate mode after 75 s.
The following maintenance actions is necessary:
- Check of both trim tank pumps, if the pumps are selected.

(j)Message DASD1 - 2
The CGCC goes into the alternate mode if in flight both DAGC send

on their ARINC label NCD, F/W or F/T for the MACH number or the BARO ALTITUDE for longer than 15 s. The computer stores a unique message in its nonvolatile memory.

The alternate mode disappears automatically on ground if both DADC transmit valid data again. A manual reset, to get the CGCC back into normal mode, is not possible.
The following maintenance action is necessary:
- Check of the DADS1 and the DADS2.

R **ON A/C 001-100,

H. Failure Warnings of Peripheral Systems in Flight
The failures described in the following paragraph do not lead to an alternate or fault mode. But they may have an influence on the performance of the CGCS.
The failures are stored in the nonvolatile memory if they occur in flight. They are displayed on the ground under LAST FLIGHT of the flight history read-out.

NOTE : If the engine fuel flow exceeded 100 kg/h during an additional use of the engines for ground operations only before a flight history read-out is made, the failures are displayed under FLIGHT -1.

(1)Message IRS1 or IRS2
The message is stored if during flight one or both IRS transmit on the pitch angle data word the subsequent data:
- FW for longer than 10 s.
- FT for longer than 10 s.
- NCD for longer than 10 s.
If one or both IRS transmit invalid data or if the difference between both outputs is more than 0.5 degrees, the CGCC calculates with a fixed value of +5 degrees pitch up. This event is not indicated to the crew.
The following maintenance action is necessary:
- Check of the IRS shown in the message.

J. Failure Warnings of Peripheral Systems on Ground
The failures described in the following do not lead to an alternate mode or fault mode. But they can have an influence on the performance of the CGCS. The failures are not stored in the nonvolatile memory.
They are displayed during the execution of an availability test as long as they exist.
(1)Message FMS1 or FMS2
A failure warning in the ZFW data word and/or the ZFCG data word for more than 10 s leads to the message.

The following maintenance action is necessary:
- Check of the FMS shown in the message.

(2)Message NO DATA FROM FMS1 or NO DATA FROM FMS2 or no DATA FROM FMS1-2.
The message is shown if the subsequent occurs:
- ZFW and ZFCG either from FMS1 or FMS2 are not available.
- One FMS is in Functional Test.
- The received ZFW and ZFCG are out of range:
  - ZFW less than 75 000 kg
  - ZFW more than 200000 kg
  - ZFCG less than 10 % MAC
  - ZFCG more than 40 % MAC

The following maintenance actions are necessary:
- Check whether the inserted ZFW and ZFCG is out of range.
- Check of the FMS, which is mentioned in the message.
- Check of the CGCC.

(3)Messages WBS1, WBS2, NO DATA FROM WBS1 or NO DATA FROM WBS2 TBD.
The messages will be defined after certification of a WBS.

(4)Message IRS1 or IRS2
A failure warning on the pitch data word for more than 10 s leads to this message.
The following maintenance action is necessary:
- Check of the IRS mentioned in the message.

(5)Message NO DATA FROM IRS1 or NO DATA FROM IRS2.
The message is shown if one or both IRS transmit on their data word the following:
- F/T for more than 10 s,
- NCD for more than 10 s.

The following maintenance actions are necessary:
- Check of the IRS.
- Check of the wiring between the CGCC and the IRS.
- Check of the CGCC.

(6)Message NO DATA IRS1-2
The message is shown, if IRS transmit NCD or F/T on their data word. It is normally shown, if on the ground both IRS are switched off by the crew.
In that case the A/C CG transmitted by the CGCC is computed with 5° pitch up.

(7)Message FFML or FFMR
This message appears only when the aircraft is on ground. The message is displayed if one or more FFM transmit a F/W signal in their data word for a period longer than 10 s.
The following maintenance actions is necessary:
- Check of the FFM.

(8)Message NO DATA FROM FFML or NO DATA FROM FFMR
These messages appear only when the aircraft is on ground. The messages are displayed if one FFM transmits one of the following signals in its data word for a period longer than 10 s:
- F/T for more than 10 s.
- NCD for more than 10 s.

The following maintenance actions are necessary:
- Check of the FFM shown in the message.

- Check of the wiring between the FFM and the CGCC.
- Check of the CGCC.

(9)Message DADS1 or DADS2
The message is shown if one DADS transmits a F/W on its Mach number data word or its altitude data word for more than 10 s.
The following maintenance action is necessary:
- Check of the DADS shown in the message.

(10)Message NO DATA FROM DADS1 or NO DATA FROM DADS2
The message is shown if one DADS transmits a F/T or NCD for more than 10 s on its altitude data word.
The following maintenance action is necessary:
- Check of the DADS shown in the message.

R **ON A/C 001-100,

K. CGCC Input Monitoring

(1)Message FLIGHT/GROUND SWITCH
The CGCC compares the status of the flight/ground switch against the SSM of the Mach number of both DADCs. A discrepancy lasting longer than 3 min leads to the message.
The message is kept in the nonvolatile memory of the CGCC and shown under LAST FLIGHT of the flight history test, if the failure occurs in flight.
On the ground the message is shown during an availability test as long as the failure is present.
The following maintenance actions are necessary:
- Check of the flight/ground switch.
- Check of the aircraft wiring.
- Check of the CGCC.

L. Cross Reference to Last Flight

(1)Message REFER LAST FLIGHT
This message is shown during an availability test if in flight a fault mode or an alternate mode occured. The message is only then shown if the failure disappears after landing, but the CGCC remains in the fault - or the alternate mode. However, the reason for this mode is indicated under LAST FLIGHT of the flight history test.

NOTE : The count of flight legs will also be incremented by one if the engine fuel flow exceeded 100 kg/h during the use of the engines for ground operations only. Therefore the message REFER TO LAST FLIGHT will not appear after such an operation. The reason for the fault, however, is shown under FLIGHT -1.

R **ON A/C 001-100,

7. Interfaces
For the realization of its various control functions, the CGCC provides a number of digital input/output interfaces on ARINC transmission lines, analog inputs and discrete inputs/outputs. The digital I/O data has octal labels.

A. ARINC Channel Inputs (Ref. Fig.) (Sheet 1 of 4)
The CGCC provides ARINC 429 inputs for the systems mentioned below and three additional spare inputs.

1 Fuel Quantity Indication System
The CGCC is supplied by one FQI ARINC 429 bus and accepts the following data:
- label 256 Fuel Quantity - left outer tank,
- label 257 Fuel Quantity - left inner tank,
- label 260 Fuel Quantity - center tank,
- label 261 Fuel Quantity - right inner tank,
- label 262 Fuel Quantity - right outer tank,
- label 263 Fuel Quantity - trim tank,
- label 324 Pitch Attitude,
- label 325 Roll Attitude.

2 Weight and Balance System
Each CGCC channel is supplied with one WBS ARINC 429 bus and accepts the following data:
- label 075 Gross Weight in lbs.,
- label 076 Longitudinal CG.

The data received on both channels are consolidated.

3 Flight Management System
Each computer channel is supplied with one FMS ARINC 429 bus and accepts the following data:
- label 066 Zero Fuel CG,
- label 074 Zero Fuel Weight.

4 Digital Air Data System
Each CGCC channel accepts the following data supplied by DADC1 or respectively by DADC2:
- label 203 Altitude (1013.25 mb),
- label 205 Mach Number.

5 Inertial Reference System
Each computer channel accepts the Pitch Angle (label 324) supplied by the IRS 1 respectively IRS 2.

6 Fuel Flow Indicators
The CGCC is supplied by two Fuel Flow ARINC buses dedicated to the left respectively right fuel flow indicator and accepts the Fuel Flow (label 347) on each input.

B. Analog Inputs (Ref. Fig.) (Sheet 1 of 4)
The CGCC has a synchro input for data supplied by the stabilizer position synchro having the following characteristics:
- 0° synchro = 0° flight surface,
- 1.6 ° synchro = 1° flight surface,
- synchro range = -180° to +180°,
- flight surface range = +3° to -14°.

**ON A/C 001-100,

C. Discrete Inputs (Ref. Fig.) (Sheets 1 of 4, 2 of 4 and 3 of 4)
The CGCC provides discrete inputs for the input sources mentioned below as well as a number of spare inputs. The level status is as follows:
- Ground signal is represented by a voltage between 0 and 3.5 V DC on a resistance of ≤10 Δ to DC Ground.
- 28 V DC is represented by a voltage between +18.5 and 36.0 V DC on a resistance of ≥ 100 kΔ to DC Ground.
- Open Voltage (O.V.) if the circuit is open.

1 Refuel Mode Select
Source : Refuel/defuel mode selector switch
28 V DC : Refuel selected
0 V DC : Refuel not selected.

2 Flight/Ground Signal
Source: Landing gear relay
O.V. : in Flight
Ground: On Ground.

3 CGCC Outputs Enabled
Source : trim tank pump control switches
O. V. or 28 V : Both pumps off
Ground : Either pump on.

4 AUTO/FWD Mode Select Switch
Source : Switch on fuel control panel
Ground : FWD mode
WLDV : AUTO mode, (WLDV = White Light Dimming Voltage).

5 CGCC System Fault Feedback
Source : FAULT Light on Fuel Control Panel
Ground : FAULT
ALDV : No FAULT, (ALDV = Amber Light Dimming Voltage).

6 Pump Low Pressure Signals
Source : 2 Center Tank Pumps
4 Inner Tank Pumps

2 trim tank Pumps
Ground : Signalled OFF or signalled ON and failed
ALDV : Signalled ON and running
The pumps require up to 0.5 s to operate the pressure switches.

7 Valve Open Signals
Source : 2 AFT transfer valves (valves E and F)
1 FWD transfer control valve (valve C)
1 FWD auxiliary transfer valve (valve D)
28 V DC: Valve open
O.V. : Valve not open

8 Valve Close Signals
Source : 2 AFT transfer valves (valves E and F)
1 FWD transfer control valve (valve C)
1 FWD auxiliary transfer valve (valve D)
28 V DC : Valve closed
O.V. : Valve not closed

9 Refuel/Transfer Valve Status
Source : Solenoid refuel transfer valve (valve B)
28 V DC : commanded open (3 s delay)
Ground : commanded closed

10 Level Sensor Switching Signals
Source : 1 trim tank calibration sensor
1 trim tank low level sensor
1 trim tank high level sensor
1 center tank high level sensor
2 Inner Tank Calibration Sensors,
additional center tank low level sensor
(if ACT is installed)
O.V. or 28 V DC : Sensor wet
Ground : Sensor dry

11 Programmable Inputs
Source : 3 hardwired input pins allowing adjustment of airline dependant safety margins as follows:

Program Pin 1	2	3	Airline dependant safety margins
OPEN	OPEN	GDN	1.5 % MAC at 150 t
OPEN	GND	OPEN	1.0 % MAC at 150 t
GND	OPEN	OPEN	0.5 % MAC at 150 t
GND	GND	GND	0.0 % MAC at 150 t

12 AFT CG WARNING SYSTEM FAILURE
Source : Flight warning computer
Ground : No THS system failure
Open circuit : THS system failure

13 AFT CG WARNING CONFIGURATION PROBLEM
Source : Flight warning computer
Ground : No THS system configuration problem
Open circuit : THS configuration problem

14 AFT CG WARNING CG CAUTION
Source : Flight warning computer
Ground : Caution not valid
Open Circuit : Caution valid

**ON A/C 001-100,

D. ARINC Channel Outputs (Ref. Fig.) (Sheet 4 of 4)
The CGCC provides one ARINC 429 output bus which is connected to the SGUs of the ECAM system and the DFDAU of the Aircraft Digital Information System.
The CGCC transmits the following 32 bit words on its output bus:
- Longitudinal CG Data Word
  Label = 076
  Units = % MAC
  Range = 163.84
  Significant bits = 14 (without sign bit)
  Resolution = 0.01
- Gross Weight Data Word
  Label = 075
  Units = lbs
  Range = 1, 310, 720
  Significant bits = 15 (without sign bit)
  Resolution = 40

Both words are transmitted in BNR code with a minimum transmit interval of 100 msec respectively a maximum transmit interval of 200 msec. Both words contain the following status information in bits 30 and 31.

Bit 31/30	Definition
0 0	Failure warning in case of - detected CGCC or FQI faults - FQI/CGCC monitor disagreement due to undetected faults
0 1	No computed data after engine shut down (on ground FF <200 kg/h) until insertion of new valid ZFW and ZFCG values.
1 0	Functional test, during self-test and flight history read out.
1 1	Normal operation, as long as ZFW and ZFCG are valid and either FQI and monitor data agree.

- Equipment Code Word
  Label = 377
  Equipment Identifier 3E (hexadecimal)

- Discrete Word with label 270 containing the following information:

Bit	Function	Bit 1	Status 0
1	Label	X	
2	Label		X
3	Label	X	
4	Label	X	
5	Label	X	
6	Label		X
7	Label		X
8	Label		X
9	SDI		X
10	SDI		X
11	CG control mode	Alt.	Norm
12	AUTO/FWD Mode Selector Switch	Man.	Auto
13	CGCC outputs enabled	No	Yes
14	CG check required	Yes	No
15	Aft transfer from center tank activated	Yes	No
16	Aft transfer from inner tank activated	Yes	No
17	Normal forward transfer activated	Yes	No
18	Fast forward transfer activated	Yes	No
19	Spare		
20	Spare		
21	Spare		
22	Spare		
23	Spare		
24	Spare		
25	Spare		
26	Spare		
27	Spare		
28	ACT installed	Yes	No
29	ACT installed	Yes	No
30	SSM		
31	SSM		
32	Parity (odd)		

- Maintenance word with label 350 containing the following information:

Bit	Function	Bit 1	Status 0
1	Label	X	
2	Label	X	
3	Label	X	
4	Label		X
5	Label	X	
6	Label		X
7	Label		X
8	Label		X
9	SDI		X
10	SDI		X
11	CG control system fault	Yes	No
12	AFT CG warning system failure	Yes	No
13	AFT CG warning config. problem	Yes	No
14	FQI1 data	invalid	valid
15	FF1 data	invalid	valid
16	FF2 data	invalid	valid
17	FMC1 data	invalid	valid
18	FMC2 data	invalid	valid
19	WBC1 data	invalid	valid
20	WBC2 data	invalid	valid
21	ADC1 data	invalid	valid
22	ADC2 data	invalid	valid
23	IRS1 data	invalid	valid
24	IRS2 data	invalid	valid
25	Spare		
26	Flight/ground switch signal	invalid	valid
27	FQI2 data	invalid	valid
28	1.5% MAC more FWD	X	
29	Additional 2.3% MAC more FWD	X	
30	SSM		
31	SSM		
32	Parity (odd)		

- Maintenance word with label 351 containing the following information:

Bit	Function	Bit 1	Status 0
1	Label	X	
2	Label	X	
3	Label	X	
4	Label		X
5	Label	X	
6	Label		X
7	Label		X
8	Label	X	
9	SDI		X
10	SDI		X
11	TT pump left	failed	OK
12	TT pump right	failed	OK
13	Refuel/transfer valve	failed	OK
14	FWD transfer control valve	failed	OK
15	FWD auxiliary transfer valve	failed	OK
16	AFT transfer valve, left	failed	OK
17	AFT transfer valve, right	failed	OK
18	Spare		
19	Spare		
20	Spare		
21	Spare		
22	Spare		
23	Spare		
24	Spare		
25	Spare		
26	Spare		
27	Spare		
28	Spare		
29	Spare		
30	SSM		
31	SSM		
32	Parity (odd)		

E. Discrete Outputs (Ref. Fig.) (sheet 4 of 4)

**ON A/C 001-100,

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(Ref. Fig. 022) (Sheet 1 of 4)

**ON A/C 001-100,

(Ref. Fig. 022) (Sheet 2 of 4)

**ON A/C 001-100,

(Ref. Fig. 022) (Sheet 3 of 4)

**ON A/C 001-100,

(Ref. Fig. 022) (Sheet 4 of 4)

**ON A/C 001-100,

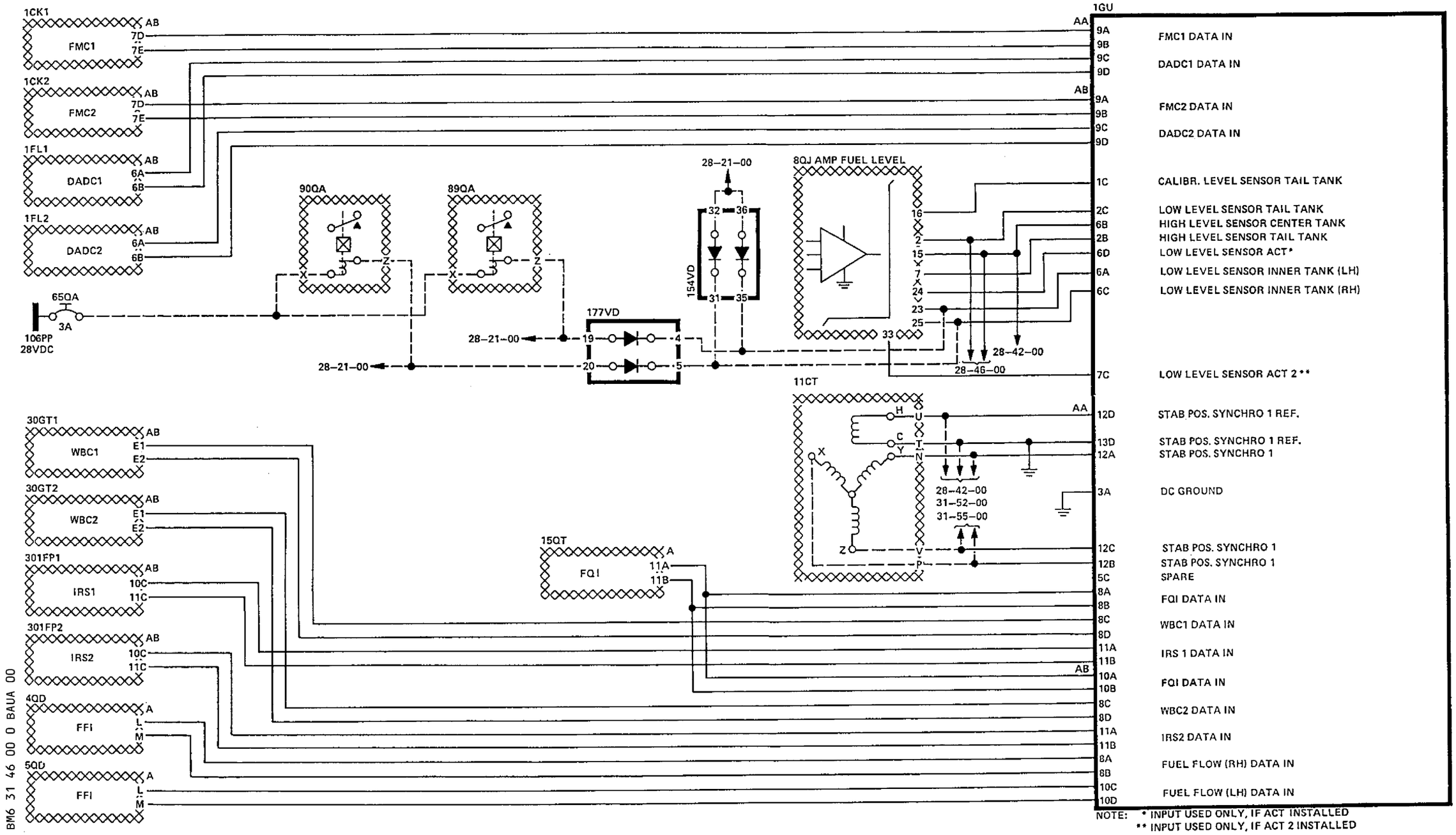
The CGCC provides the following output signals for control and indication:

1 Left Aft Transfer Valve
28 V DC: Open valve E (load = 0.11 A inductive)
<1 V DC : Close valve E

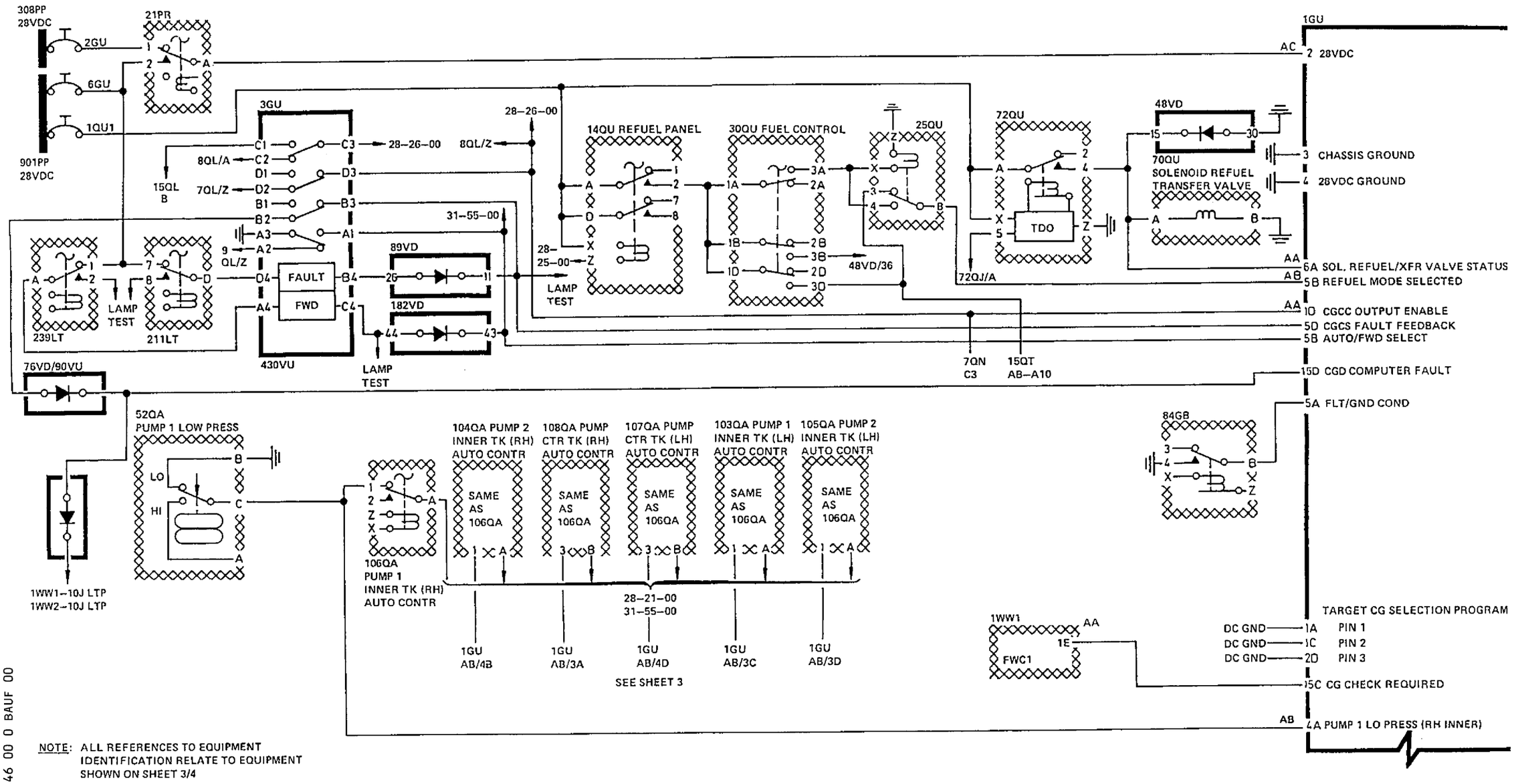
2 Right Aft Transfer Valve
28 V DC : Open valve F (load = 0.11 A inductive)
<1 V DC : Close valve F

3 FWD Auxiliary Transfer Valve
28 V DC : Open Valve D (load = 0.11 A inductive)
<1 V DC : Close Valve D

4 Refuel/Transfer Valve
28 V DC : Open Valve B (load = 3.0 mA)
<1 V DC : Close Valve B



CGCS Schematic Diagram (Sheet 1 of 4)
Figure 022



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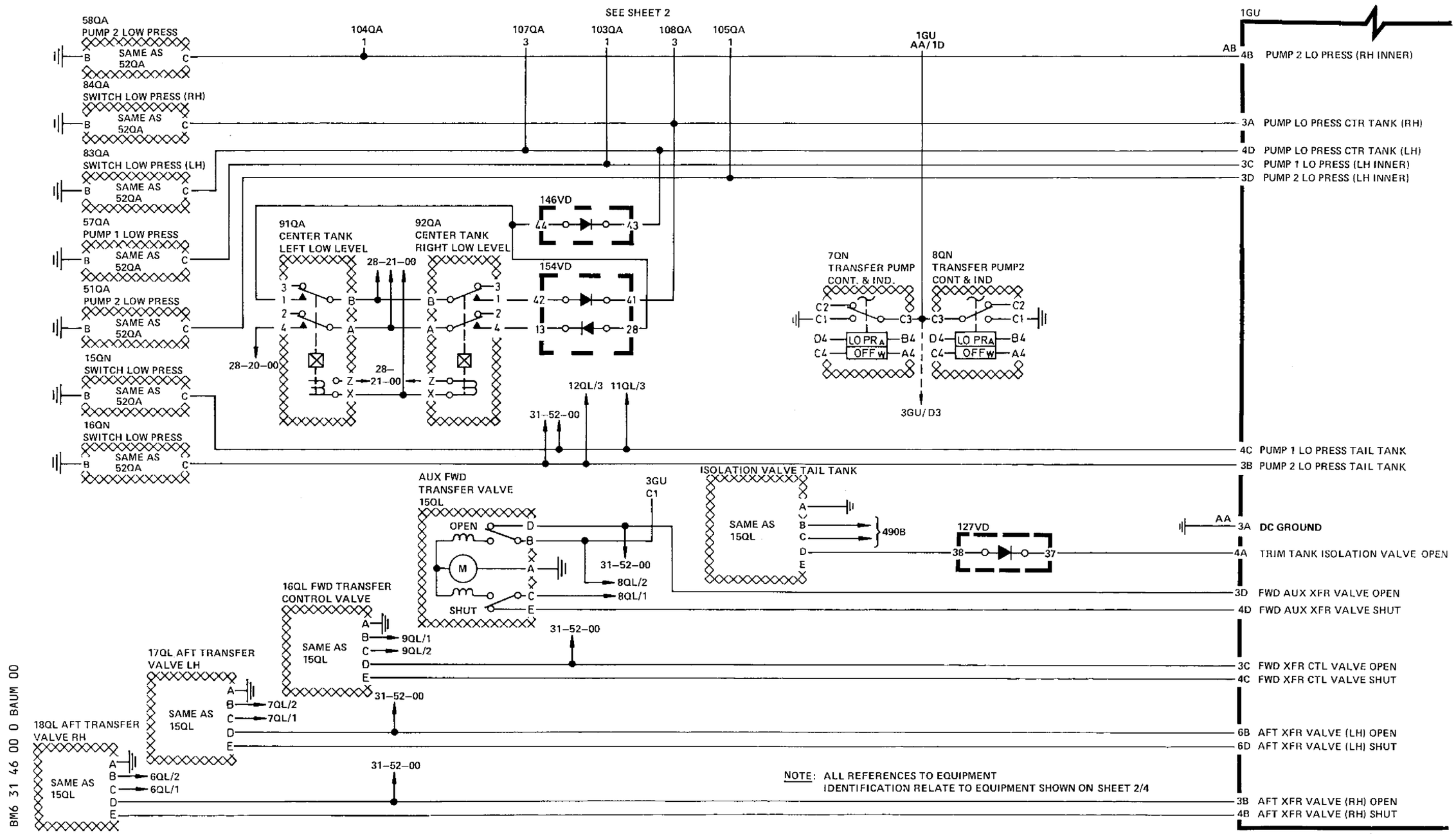
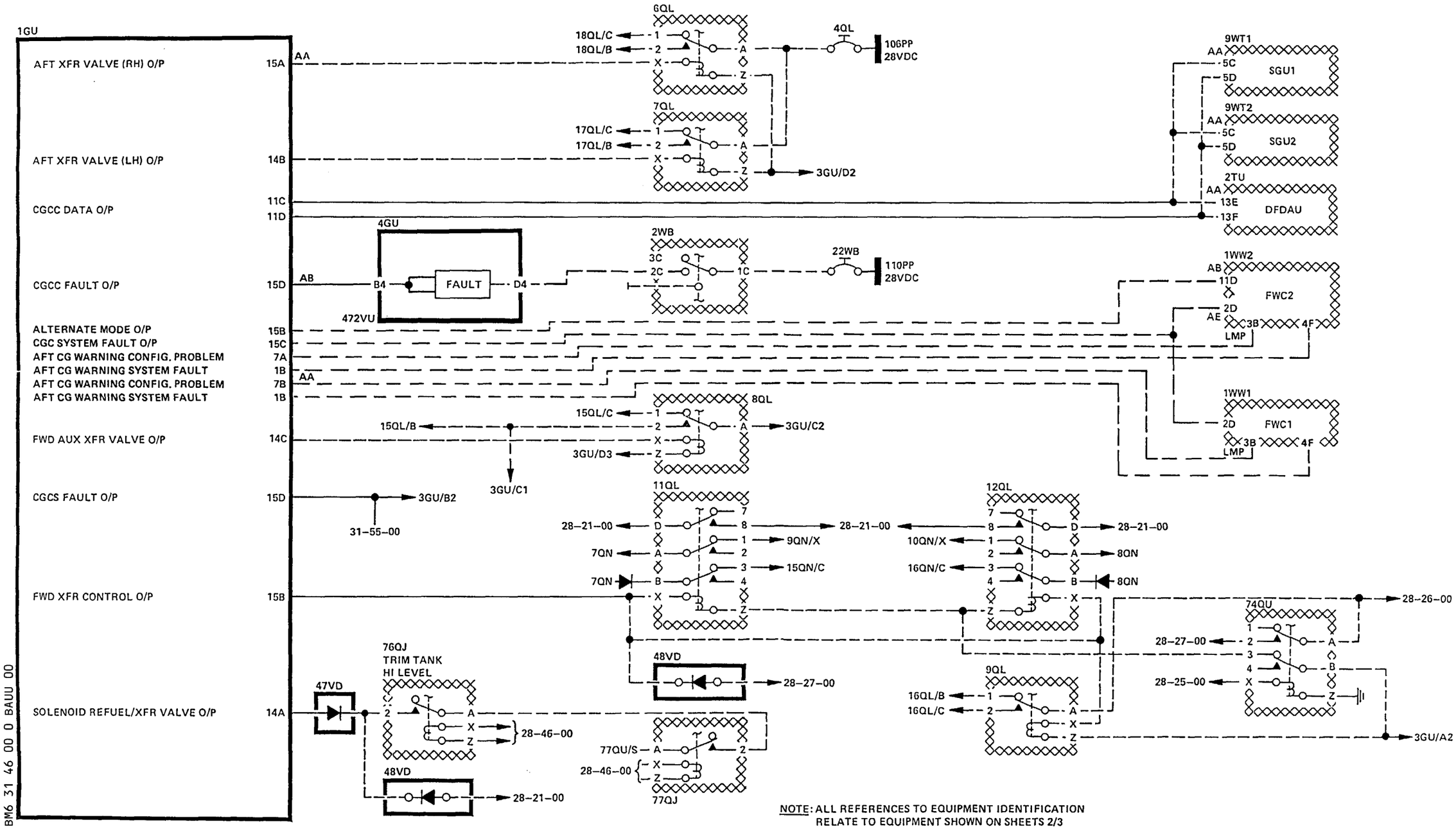
CGCS Schematic Diagram (Sheet 2 of 4)
Figure 022



CGCS Schematic Diagram (Sheet 3 of 4)
Figure 022



NOTE: ALL REFERENCES TO EQUIPMENT IDENTIFICATION RELATE TO EQUIPMENT SHOWN ON SHEETS 2/3

CGCS Schematic Diagram (Sheet 4 of 4)
Figure 022

5 Normal FWD Transfer Control Valve
28 V DC : Close valve C, de-energize TT Pumps (load = 0.59 A inductive)
<1 V DC : Open valve C, energize TT Pumps

6 CG Control System Fault I
Destination : Flight Warning Computer (FWC)
28 V DC : No system failure
O.V. : System failure

7 CG Control System Fault II
Destination : FAULT light on fuel control panel
O.V. : No system failure
Ground : System failure

8 CG Control Computer Fault
Destination : FAULT light on maintenance panel
O.V. : No computer failure
Ground : Computer failure

9 Alternate Mode
Destination : FWC
O.V. : Normal mode
Ground : Alternate mode

10 CG Check Required
Destination : FWC
O.V. : No check required
Ground : CG check required

11 CG More Forward
Destination : FWC
O.V. : No target CG reduction
Ground : CG more forward

Besides the signals mentioned above, figure 023 also shows the busbars for CGCS supply as well as various busbars for several related systems.

1. General

**ON A/C 101-200,

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(Ref. Fig. 001)

**ON A/C 101-200,

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The Center of Gravity Control System (CGCS) is part of the aircraft's Trim Tank System (Ref. 28-00-00, P. Block 001), which is installed to store extra fuel for extra range and for better fuel economy due to center of gravity control and associated trim drag reduction.

The CGCC is also able to operate on aircraft without or with one or with two additional center tanks (ACT).

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The main components of the system are:
- the Trim Tank in the horizontal stabilizer,
- the Trim Tank Transfer System, used for fuel transfer between the trim tank and the center and inner wing tanks or the ACT, if installed,
- the Center of Gravity Control System, used for the determination of the center of gravity (CG) and the control of the automatic fuel transfer in forward (FWD) and aft direction.

The CGCS contains a Center of Gravity Control Computer (CGCC).
The CGCC acts via two channels. With its monitor channel the CGCC continuously monitors the fuel quantity information and the status of the transfer system components. Via its command channel the CGCC sends calculated command signals to the trim tank transfer system. This causes fuel to be transferred from or to the trim tank until the calculated actual center of gravity is equal to the target center of gravity.
The actual center of gravity position is calculated on the basis of the following data:
- fuel quantity in each tank determined by the Fuel Quantity Indication (FQI) system,
- fuel tank moment data (CG of each individual fuel tank),

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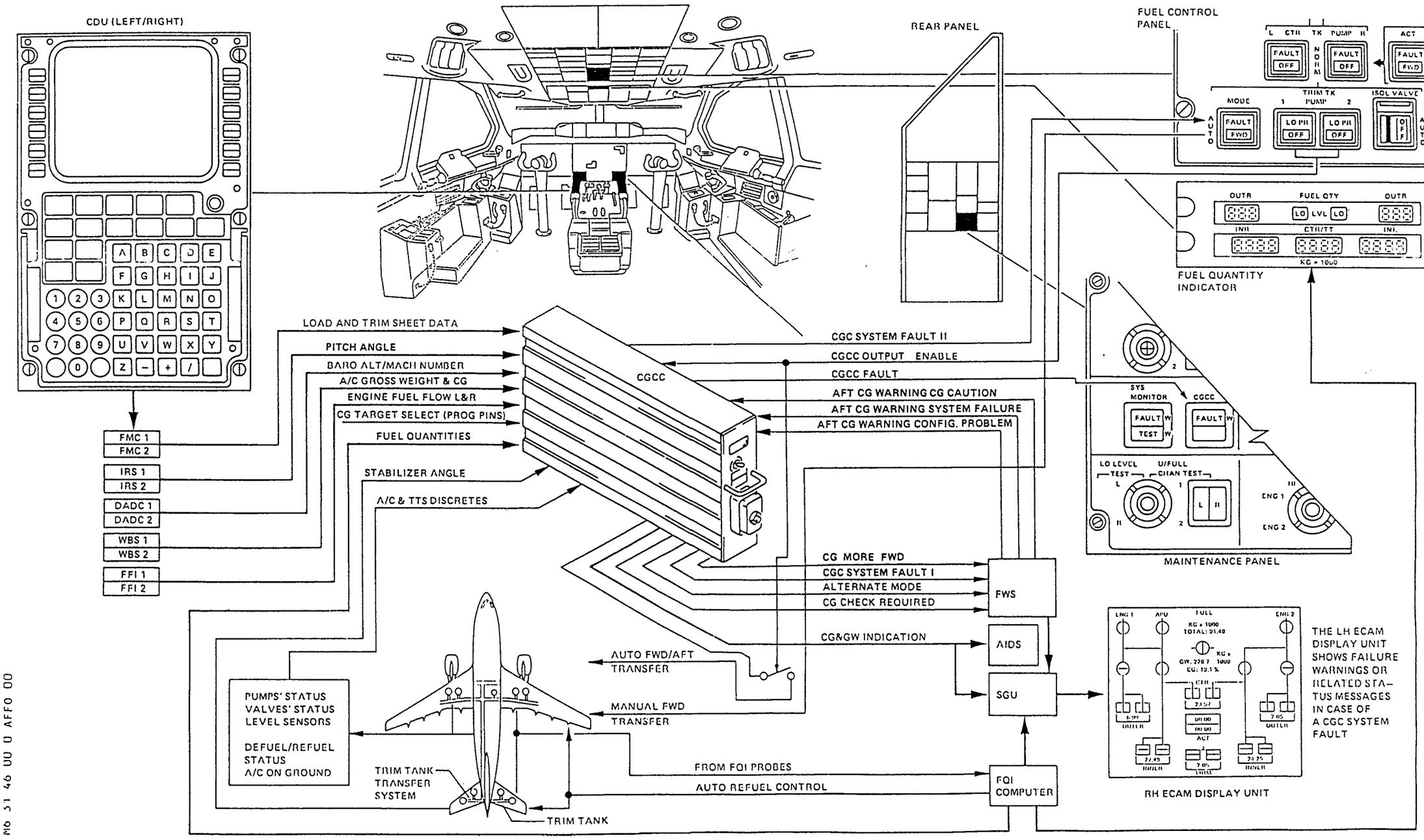

CGCS and Related Systems
Figure 001

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- zero fuel weight (ZFW) and zero fuel center of gravity (ZFCG).

The latter data may be entered by the flight crew as load and trim sheet data, before takeoff, on the Control and Display Units (CDU) and is transmitted via the Flight Management Computer (FMC) to the CGCC.
In place of the FMC data the CGCC can also get inputs from a Weight and Balance System (WBS). The WBS supplies the CGCC with GW- and CG data instead of ZFW and ZFCG.
The CGCC uses the following additional aircraft data:

- position of the trim tank isolation valve,
- engine fuel flow,
- baro altitude,
- mach number.

The influences of this data on the calculations will be explained in the following paragraphs.
As a result of the CG determination, the CGCC generates the command signals for the pumps and valves of the Trim Tank Transfer System to equalize the calculated actual center of gravity and the target center of gravity.
The center of gravity control with respect to the target CG depends on the following conditions:

- with aircraft on the ground, there is no CG control,
- with aircraft in flight, the target CG is set in accordance to flight level (aircraft below or above FL 205) and airline configuration as for example the airline load and trim sheet procedure and the aircraft internal layout.
- with aircraft descending below FL 200, the CG control is terminated and all trim tank fuel is transferred forward to the center tank (normally before landing).

In normal operation below and above FL 205, the system maintains the CG within 0.5 % MAC forward of the target center of gravity.
For this it starts a FWD or aft transfer. Aft transfers are only possible above FL205.
Above FL 205 the CGCC starts an aft transfer if the actual CG is more than 0.7 % MAC before the target CG. The aft transfer stops if the actual CG is 0.2 % MAC before the target CG.
The monitor function of the CGCC comprises the following:

- monitoring of the transfer system (valves and pumps),
- monitoring of all input data (completeness and validity),
- self-monitoring (cross-checks between CGCC command and monitor channels).

In addition to the control and display units, the following controls and displays for the CGCS and its associated systems are located in the flight compartment:

- **TRIM TK MODE** pushbutton on the fuel control panel, for the selection of a manual FWD transfer or automatic control of the transfer system.
- **TRIM TK PUMP 1/2** pushbuttons on the fuel control panel, for the pre-selection of the trim tank pumps and valves, and to enable/disable the CGCC to control valves and pumps of the trimtank transfer system.
- **FAULT** caption on the **TRIM TK MODE** pushbutton, for indication of a system failure either from the FWC, the isolation valve control logic or the CGCC.
- **ISOL VALVE** pushbutton on the fuel control panel, for isolation of the trim tank.
- **CGCC FAULT** pushbutton on the maintenance panel, for indication of a

CGCC failure.
- Display units of the Electronic Centralized Aircraft Monitor (ECAM) System, for display of FQI data, center of gravity, gross weight and system status data of the CGCS. The system status is displayed on the LH ECAM display while the other data are displayed on the FUEL page of the RH ECAM display.
- Fuel quantity indicator, for the indication of fuel data.

The CGCC is also connected to the Aircraft Integrated Data System (AIDS), for data reporting and recording.

2. Component Location

**ON A/C 101-200,

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(Ref. Fig. 002)

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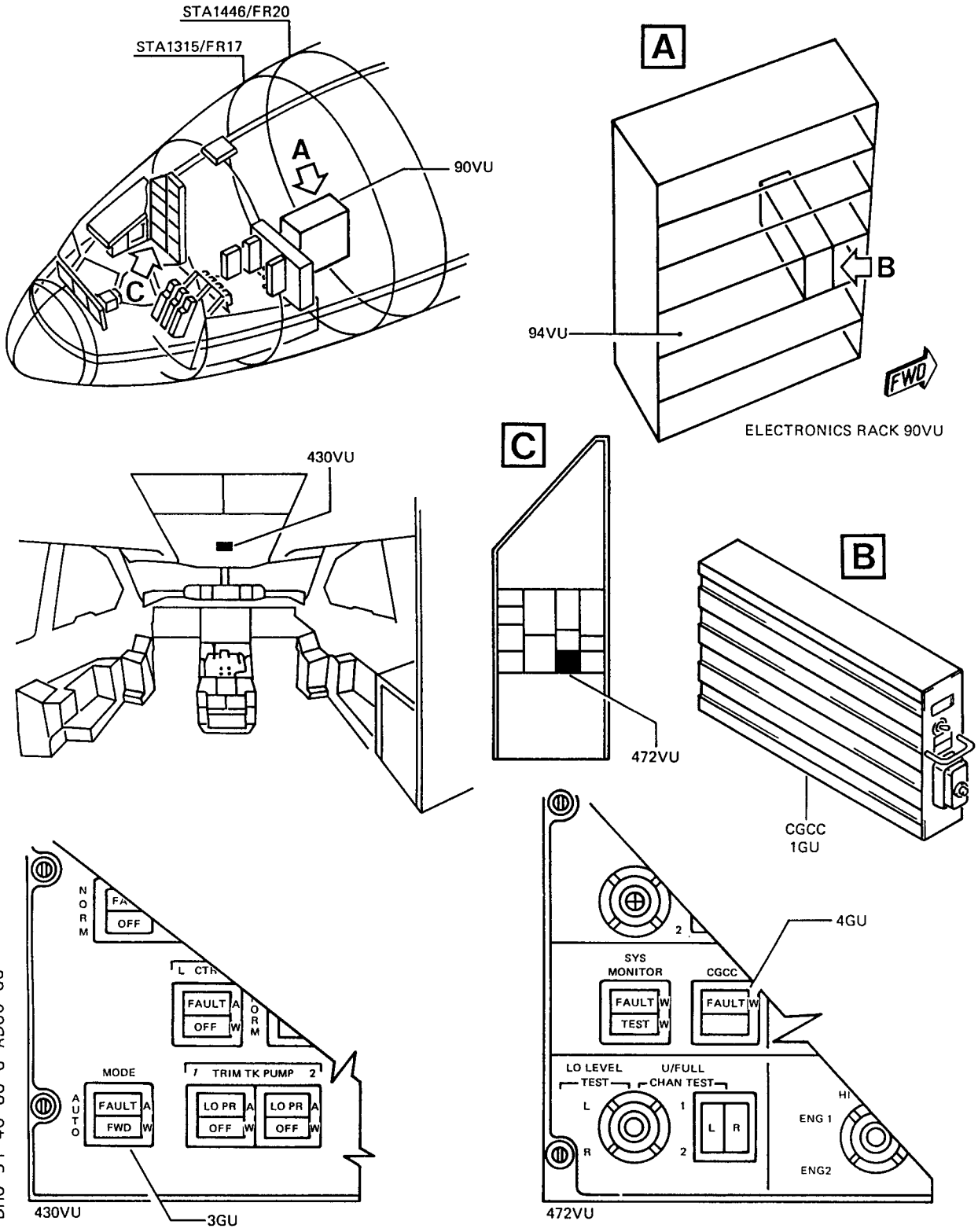
FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF
1GU	COMPUTER, CGC	94VU	121	121BL	N/R
3GU	P/BSW INDICATOR, FAULT/FWD	430VU	210		N/R
4GU	P/BSW INDICATOR FAULT	472VU	212		N/R



Component Location
Figure 002

**ON A/C 101-200,

3. System Description

A. Center of Gravity Control System
(Ref. Fig. 003)
The illustration shows the CGCC and its associated input and output systems.
The main component of the CGCS is the CGCC, consisting of a command and a monitor channel. The command channel calculates the CG position, determines the target CG and generates control signals for the valves and pumps of the Trim Tank Transfer System. By transferring fuel in FWD or AFT direction, a CG shift of more than 11 % MAC may be achieved under control of the CGCC. The monitor channel checks the validity of input data, the computation of CG position and target CG and the status of the transfer system (pumps, valves and sensors).
Both channels perform self-monitoring at power-up and cross-check functions of the inputs and results of the other channel.
The calculation of CG position is based on the following data:
- on ZFW and ZFCG determined by load and trim sheet data inserted by the crew and transmitted by the Flight Management System (FMS).
- Fuel quantity of all seven tanks (if the ACT is installed), supplied by the FQI computer.

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- fuel moment arms, corrected for A/C pitch attitude by the Inertial Reference System (IRS).

NOTE : If a WBS is installed, the CGCC can use the CG- and GW-data from the WBS instead of the FMS data. The CGCC accepts GW data up to 200 t.

The target CG is determinated with respect to the following data:
- airline-dependent safety margins between 0.0 % MAC and 1.5 % MAC, selected by program pins on the CGCC in steps of 0.5% MAC,
- the flight level of the A/C.

NOTE : The first selected margin remains constant for a specific aircraft during flight.
All pins are normally grounded unless otherwise specified by customer option.

The target CG is the nominal value for CG control. For flights below an altitude of FL 205 or before the A/C reaches this flight level (but with the isolation valve open), the target CG is set to the subsequent values:

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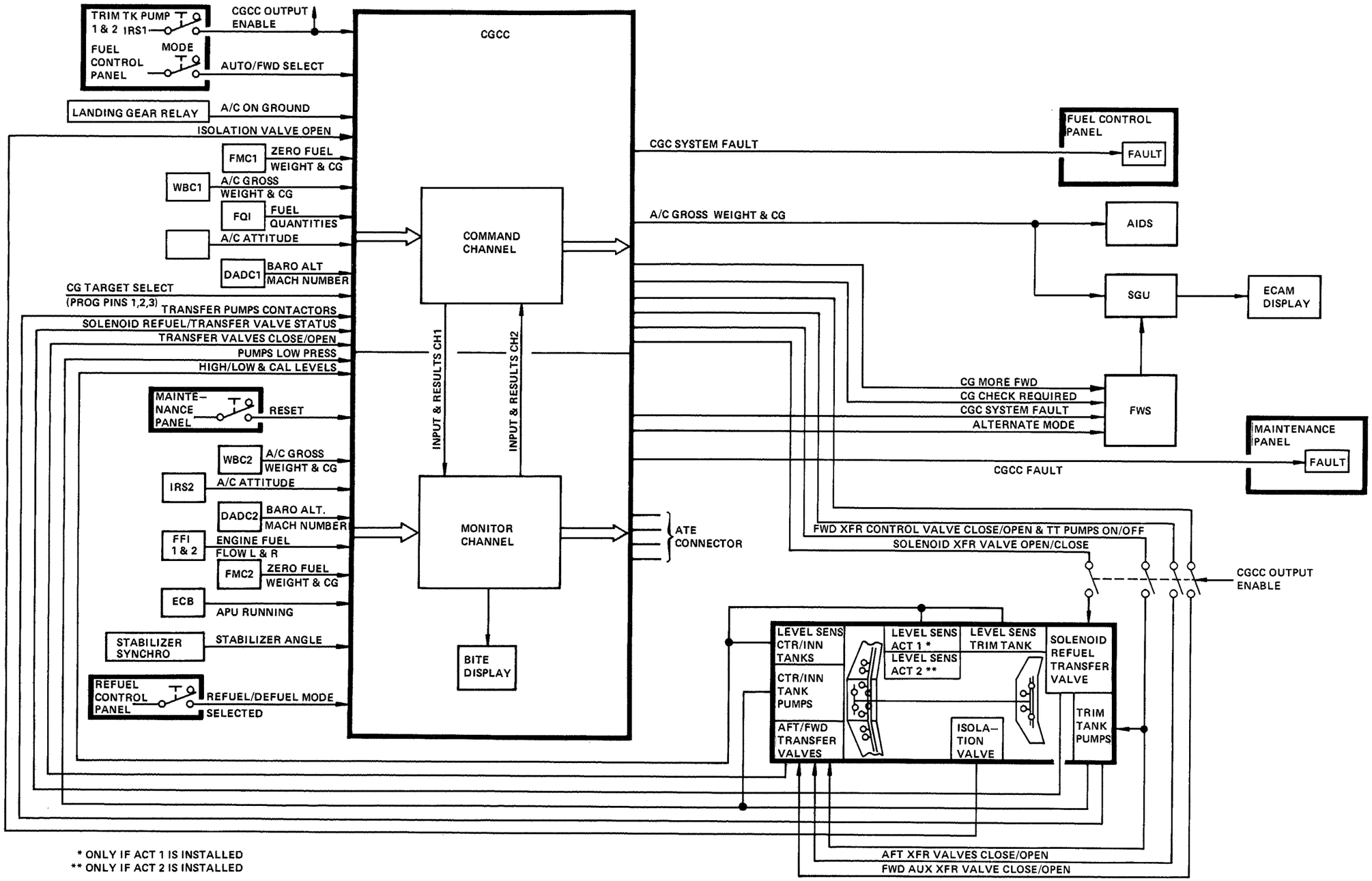

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CGCS Configuration
Figure 003

- from 31.81% MAC - delta CG at 80.0 tons
- to   33.58% MAC - delta CG at 128.6 tons
- to   35.41% MAC - delta CG at 145.0 tons
- to   35.50% MAC - delta CG at 150.0 tons.

Above FL 205 the target CG has the subsequent values:
- 37.50% MAC - delta CG at 150.0 tons
- 35.30% MAC - delta CG at 80.0 tons

with linear variation in between.
The delta CG is a safety margin and defines operational limits.
The limits are variable and depend on the airline load and trim sheet procedure.

The target CG values mentioned before are valid under normal conditions. In case of the following possible abnormalities the target CG is additionally reduced:

- if in flight the FQI system transmits fuel quantity data with a degraded accuracy (Bit 11 in the FQI ARINC 429 data is logical "1", see para. 7.A. Interfaces) the CGCC remains in normal mode but reduces the target CG by 1.5% MAC,
- if the FWS sends the signal AFT CG WARNING CG CAUTION, the CGCC reduces the target CG by 1.5% MAC or an additional 2.3 % MAC if the first transfer is not sufficient to leave the AFT CG WARNING CG CAUTION area.

As a result of the CG position calculation and target CG determination, the command channel sends control signals to the pumps and valves of the transfer system to achieve the required CG shift and receives the status signals of the controlled components.
The signal AFT CG WARNING CG CAUTION will lead to a fast FWD transfer. If the target CG is reduced by more than 1.5 % MAC second FWD shift of the target CG) the message CG MORE FWD will be sent to the ECAM.
Besides, the command channel provides the FUEL Page of the RH and LH ECAM display with gross weight (GW) and A/C center of gravity (CG). It sends the CG CHECK REQUIRED signal via the FWS to LH ECAM Display to show the message: ZFW OR ZFCG DISAGREE. And it generates the CGCS FAULT signal for the indication of a system or computer fault on the fuel control panel.
The monitor channel of the CGCC computes the present CG position and the target CG as described for the command channel. The comparsion of the computed data from the two channels makes certain that the aft limit can not be exceeded without an indication of this fact.
The monitor channel also monitors the system to detect and locate faults within the CGCC and its associated systems. If a fault is detected, it stores the fault type and its location in a nonvolatily memory. The contents of this memory are indicated on a BITE display during a flight history test.
The CGCC provides the following monitor functions:

- availability of a dual WBS, resulting in an automatic switch-over to FMS inputs, if WBS not available or fails,
- availability of both FMS inputs,
- Monitoring of transfer system components to detect jamming of valves and pump failures.
- Monitoring of all input signals for completeness, validity, absence and values out of range.

If both FMS send valid data and if the data are within certain limits (ZFW <441 lbs and ZFCG <0.1% MAC), the CGCC accepts these data. It keeps the data from the FMS1 in its nonvolatile memory, if they differ from the FMS data kept before.

If both FMS send calid data which are out of the allowed tolerances (ZFW <441 lbs or ZFCG <0.1% MAC), the CGCC gives priority to the FMS1.
It sends the message ZFW OR ZFCG DISAGREE to the LH ECAM display, if the FMS1 data differ from the data which are already kept in its nonvolatile memory. The message it not shown if no data was kept before in the CGCC.
If one of the two FMS sends invalid data, the CGCC accepts only the data

from the good FMS. It sends the message ZFW OR ZFCG DISAGREE TO THE LH ECAM display, if the FMS data differ from the data kept before in its nonvatile memory. The message is not shown if no data was kept before in the CGCC.
Gross weight /GW) and center of gravity (CG) are shown on the FUEL page of the RH ECAM display. The pilots have to check the GW and the CG against the load and trim sheet data if the message ZFW OR ZFCG DISAGREE is shown on the LH ECAM display. The message disappears after takeoff.
The monitor channel sends the ALTERNATE MODE signal and the CGC SYSTEM FAULT signal to FWS. To alert the crew the FWS has these messages displayed on the ECAM.
The monitor channel also generates the CGCC FAULT signal for the indication of a computer fault on the maintenance panel.

NOTE : Self-monitoring is carried out by both channels and includes the following functions:
- monitoring its own functions continuously,
- monitoring the power supply of the opposite channel,
- performing cross-checks by monitoring input data, computer results and control commands of the opposite channel.

All detected abnormalities are stored in a nonvolatile BITE memory and indicated in the CGCC maintenance word for readout on the BITE display. However, the CGCC enters alternate mode only if a fault affects the safety of CG control.

B. Trim Tank Transfer System

**ON A/C 101-200,

(Ref. Fig. 004)
(Ref. Fig. 005)

**ON A/C 101-200,

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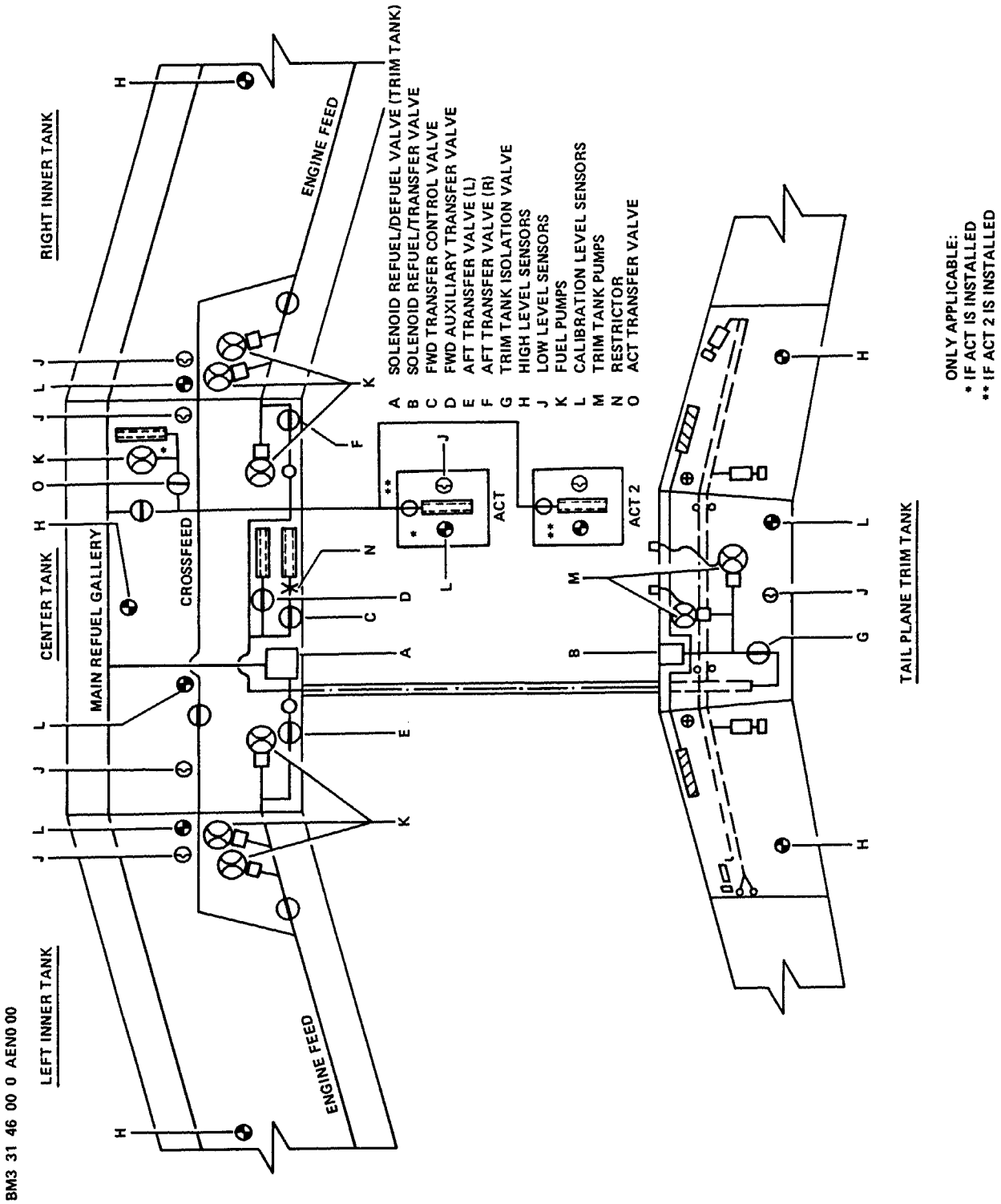
The illustration shows the Trim Tank Transfer System (TTTS), the trim tank and a part of the basic fuel system.
The TTTS, consisting of pumps, valves and level sensors, is capable to transfer fuel in the FWD and aft directions. The fuel transfer in flight is automatically controlled by the CGCC. An override facility, however, enables the flight crew to operate the FWD fuel transfer manually.
The trim tank has a capacity of approximately 5 tons and is connected via the transfer pipe to the main refuel gallery. It is provided with two pumps, used for FWD transfer, a refuel transfer valve, an isolation valve and a number of high/low and calibration level sensors.
The transfer pipe is led through the main landing gear bay. In the landing gear bay the transfer pipe is provided with a trim tank refuel/defuel valve, two aft transfer valves, a FWD transfer control valve, used



Fuel System Architecture
Figure 004

CGCC MODE	TT–PUMPS 1 AND 2	VALVE A	VALVE B	VALVE C	VALVE D	VALVE E	VALVE F
NO TRANSFER	OFF	CONTROLLED ONLY BY FQI SYSTEM	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
AFT TRANSFER CENTER TANK TRIM TANK	OFF		OPEN	CLOSED	CLOSED	OPEN	OPEN
AFT TRANSFER INNER WING TANKS TRIM TANK	OFF		OPEN	CLOSED	CLOSED	OPEN	OPEN
AFT TRANSFER LEFT INNER WING TANK TRIM TANK	OFF		OPEN	CLOSED	CLOSED	OPEN	CLOSED
AFT TRANSFER RIGHT INNER WING TANK TRIM TANK	OFF		OPEN	CLOSED	CLOSED	CLOSED	OPEN
NORMAL FORWARD TRANSFER	ON		CLOSED	OPEN	CLOSED	CLOSED	CLOSED
FAST FORWARD TRANSFER	ON		CLOSED	OPEN	OPEN	CLOSED	CLOSED
GRAVITY FWD INHIBITION MODE	OFF		CLOSED	CLOSED	CLOSED	OPEN	OPEN

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Valves and Pumps Status during Transfer Operation
Figure 005

for normal FWD transfer, and a FWD auxiliary transfer valve additionally used for fast FWD transfer. The FWD transfer control valve outlet incorporates a restrictor to reduce the transfer rate approximately to engine burn rate.
The transfer system is used to refuel the trim tank, if more fuel is necessary for a mission as the A/C can keep in its wing tanks, the center tank and the additional center tanks, if installed. The refuelling of the trim tank is then done sumultaneously with the refuelling of the other tanks via the transfer pipe. The trim tank refuel/defuel valve and the refuel transfer valve are then under control of the refuel switch and the FQI system. If the required quantity is reached and the trim tank fails to shut off on the FQI signals, the valves will be closed by a signal from the high level sensor. Besides, the valves are closed by an overflow sensor in the trim tank surge.
To allow loading flexibility at forward CG positions, on flights which do not require all tanks to be filled, a fixed quantity of fuel may be loaded into the trim tank by means of a manual transfer. This is only possible with fuel loads greater than wing tanks full.

**ON A/C 101-200,

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It is possible to refuel both additional center tanks in parallel.

**ON A/C 101-200,

If the CGCC is to control the transfer system automatically, one or both TRIM TK PUMP pushbutton and the TRIM TK MODE pushbutton the fuel control panel must be switched on, respectively switched to AUTO.
In addition, ZFCG and ZFW must be inserted by the crew via the FMS or GW and CG must be received from the WBS.
When an aft transfer is required, the CGCC opens the aft transfer valves (E and/or F) and the refuel transfer valve (B). Fuel is then transferred from the center or inner wing tanks to the trim tank, depending on which pumps are energized by the basic fuel system.
The CGCC monitors the symmetry of fuel quantity in the two inner wing tanks.
If an asymmetry in quantity of more than 441 lb is calculated, the CGCC acts to correct the situation. When fuel is transferred from the inner wing tanks to the trim tank, the CGCC controls the transfer from each inner wing tank differently until symmetry of fuel quantity in the two tanks is regained.
An aft transfer from the inner tanks is stopped, if the fuel content of at least one inner tank decreases below 1103 lb.
The transfer is terminated, if a failure occurs during an aft transfer from the center tank, for example if only one pump is active.
When the required fuel quantity has been transferred, the transfer valves are closed.

A FWD transfer is always carried out between the trim tank and the center tank. During a normal FWD transfer the trim tank pumps are energized and the FWD transfer control valve (C) open.
Each FWD transfer during CG control in normal mode causes the CG to move forward by approximately 0.5 % MAC. If the low level sensors in the trim tank indicate dry state and fuel quantity is indicated below 441 lb by the FQI system, the trim tank pumps are switched off after a time delay of 3 min.
A fast FWD transfer is initiated by the CGCC if the aircraft descends below FL 200.
In that case both valves (FWD transfer control valve and FWD auxiliary transfer valve) are used. Either in normal mode or in alternate mode, the CGCC monitors the transfer and prevents overfilling of the center tank.
Both valves are also used if a manual FWD transfer is selected by means of the TRIM TK MODE pushbutton.
Figure 005 shows which pumps and valves are operated by the CGCC under different transfer modes.
Fuel transfer is inhibited if the trim tank isolation valve, controlled by relays of the transfer system, is closed. The valve closes before landing when gears are extended. FWD transfer should be completed before. The valve opens again during refuelling and in flight after gear retraction and slats in.
An emergency FWD transfer is carried out by means of gravity fuel transfer in the event of total loss of electrical power.

C. Power Supply
(Ref. Fig. 006)

**ON A/C 101-200,

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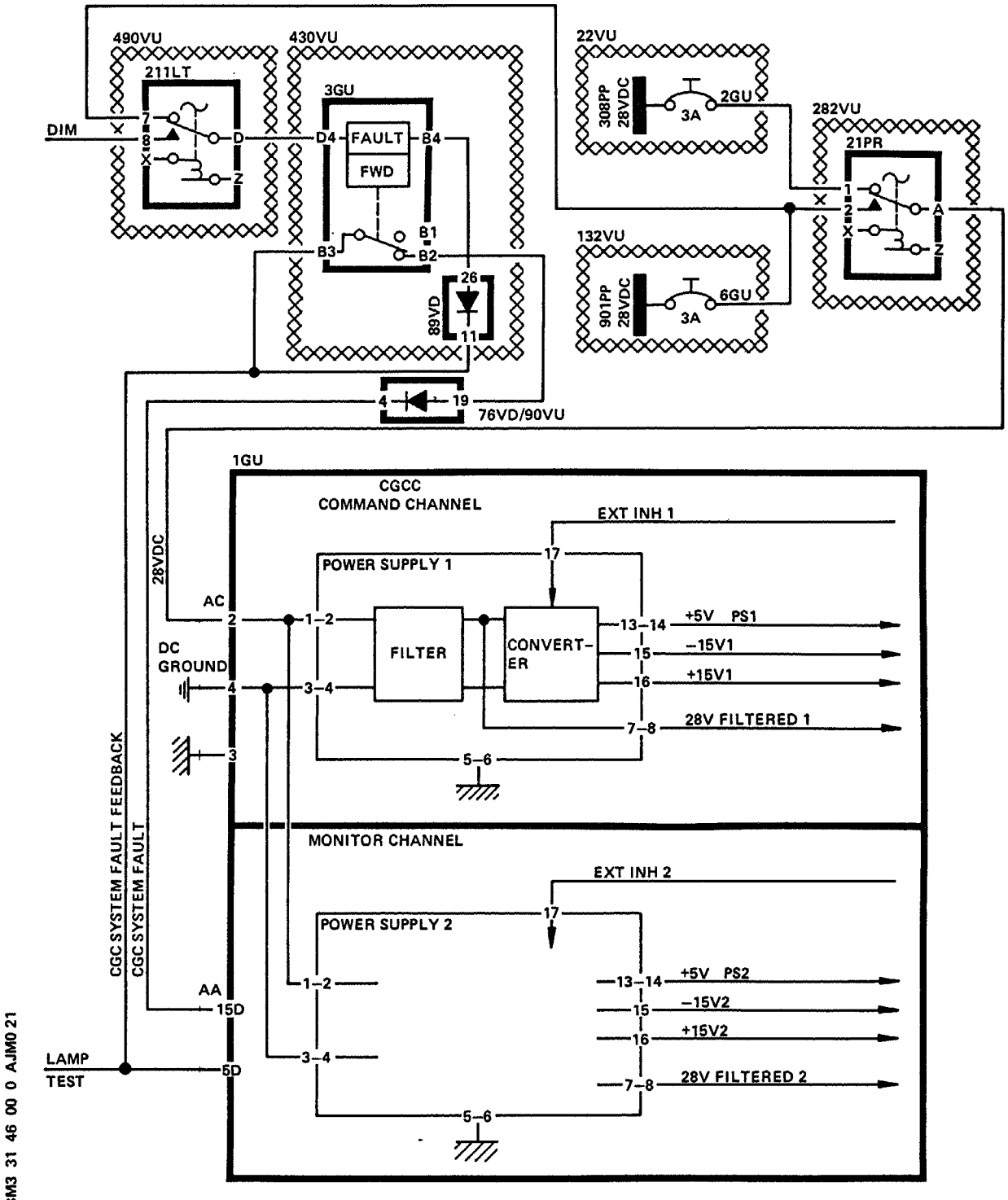
The CGCC is supplied with electrical power as long as the aircraft electrical network is supplied with power. With the aircraft in flight or on the ground, the CGCC is supplied with 28 V from DC busbar 308PP via circuit breaker 2GU on panel 22VU. The DC voltage is converted from generator 1 AC power or APU AC power. With the aircraft on the ground, during refuelling the CGCC is supplied with 28 V from the battery system via DC busbar 901PP and circuit breaker 6GU on panel 132VU. In case of emergency (voltage loss), the system FAULT lamp on the fuel control panel is supplied only by busbar 901PP.
The computer contains two identical power supplies, one for each channel, consisting of a filter section and DC/DC converter. Each power supply generates voltages of +5 V DC, +15 V DC and -15 V DC to operate the electronic circuit boards of its related channel. The filtered 28 V DC is used by the Central Processor Units (CPU) to monitor the supplies and to make certain that:
- power interrupts up to 200 ms duration do not degrade system performance,
- power interrupts of longer duration disengage the system.



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Power Distribution and Supply
Figure 006

4. Component Description

A. Center of Gravity Control Computer (1GU)

**ON A/C 101-200,

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(Ref. Fig. 007)

**ON A/C 101-200,

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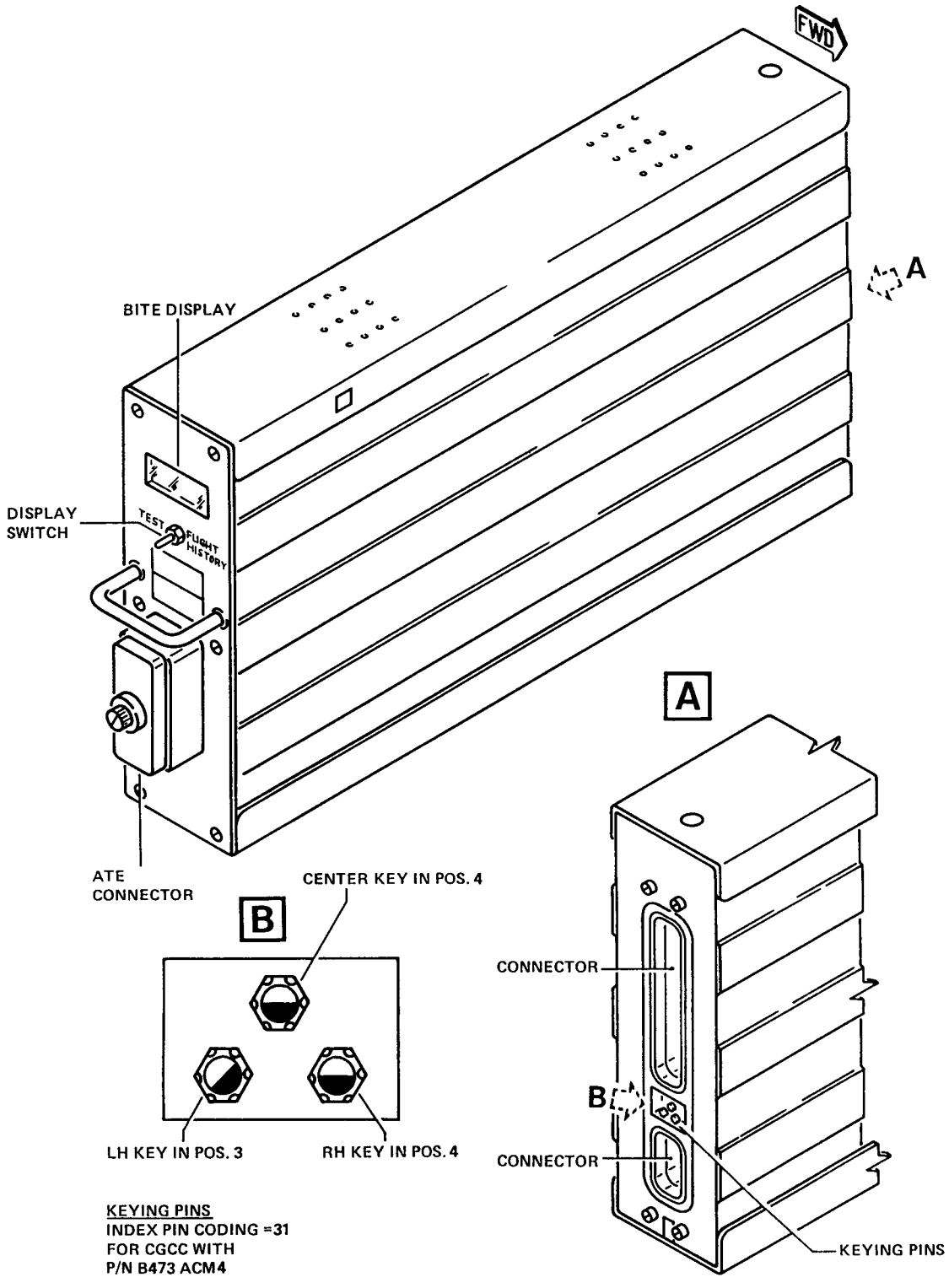
(1)Description
The CGCC evaluates and controls the aircraft's "in-flight" CG to a target figure by the transfer of fuel in either FWD or AFT direction and thereby reduces fuel consumption.
Computations are based on data signals received on various ARINC 429 buses and on aircraft discrete inputs. The computer is designed as a self-monitoring duplex computer in one box. It is housed in a 2 MCU case conforming to ARINC 600 specifications and installed in electronics rack 94VU. The front panel is provided with an alphanumeric BITE display. A spring-loaded center off switch allows availability test initiation and flight history readout. Besides an ATE connector is installed, allowing bench testing in the shop. The front face is also equipped with a handle for insertion and extraction of the computer.
The rear is provided with a connector and keying pins for shelf connection. The keying pins conform also to ARINC 600. The index pin coding for this computer is 66. That means the keying pins are in the subsequent positions:
- left hand key in pos. 2,
- center key in pos. 3,
- right hand key in pos. 5.

Because of this coding it is only possible to use this computer (P/N B349 AAM5) on aircrafts without ACT provision.
The dual channel layout of the CGCC uses similar hardware consisting of two 80C31 one chip 8-bit microprocessors, volatile and nonvolatile memories, input and output devices and power supplies.
The software with respect to algorithms, libraries and instructions, is dissimilar. The programs are written in PLM Macro as well as in ASM Macro. They cover the calculations for aircrafts with or without ACT provision but the ACT-functions are not activated. For this reason this computer may only be used on aircrafts without ACT provision.

**ON A/C 101-200,

(2)Physical Characteristics



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CG Control Computer
Figure 007

Power requirements	28 V DC, 1.2 A (computer) and 1.2 A (discretes outputs)
Power dissipation	<30 W
Packaging	ARINC 600, 2 MCU
Size:	
Length	382.0 mm (15.04 in.)
Width	57.2 mm (2.25 in.)
Height	194.5 mm (7.66 in.)
Weight	<8.16 lb
Cooling	By forced air per ARINC 600 specification

(3)Operation
The CGCC contains the following printed circuit boards:
- ARINC, Command A10, Monitor A20
- CPU, Command A11, Monitor A21
- Display, A3
- Power supply, A12, A22
- Mother board

(a)ARINC Boards

**ON A/C 101-200,

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(Ref. Fig. 008)

**ON A/C 101-200,

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(Ref. Fig. 009)

**ON A/C 101-200,

Each ARINC board accepts the reception of data on 7 lines at a rate of 12 to 14.5 Kb/s and on one line at 100 Kb/s, transmits data on one line at a rate of 13.66 Kb/s and communicates with the CPU via a dual-access common RAM. The RAM is used by the ARINC board in a write-only mode and by the CPU board in both read and write modes.

When the RAM is used by the ARINC board, it receives addresses directly from the sequencer via a buffer and data from a FIFO RAM (within the sequencer) also via a buffer.

When used by the CPU, the memory is addressed by the microcontroller via a one-directional buffer (A0-A7) and messages to the microcontroller (read) or from the microcontroller to the RAM (write) are fed via a bi-directional buffer (D0-D7). The ARINC output data transmission system operates at 13.66 Kb/s through a shift register, a sequencer and an ARINC modulator.

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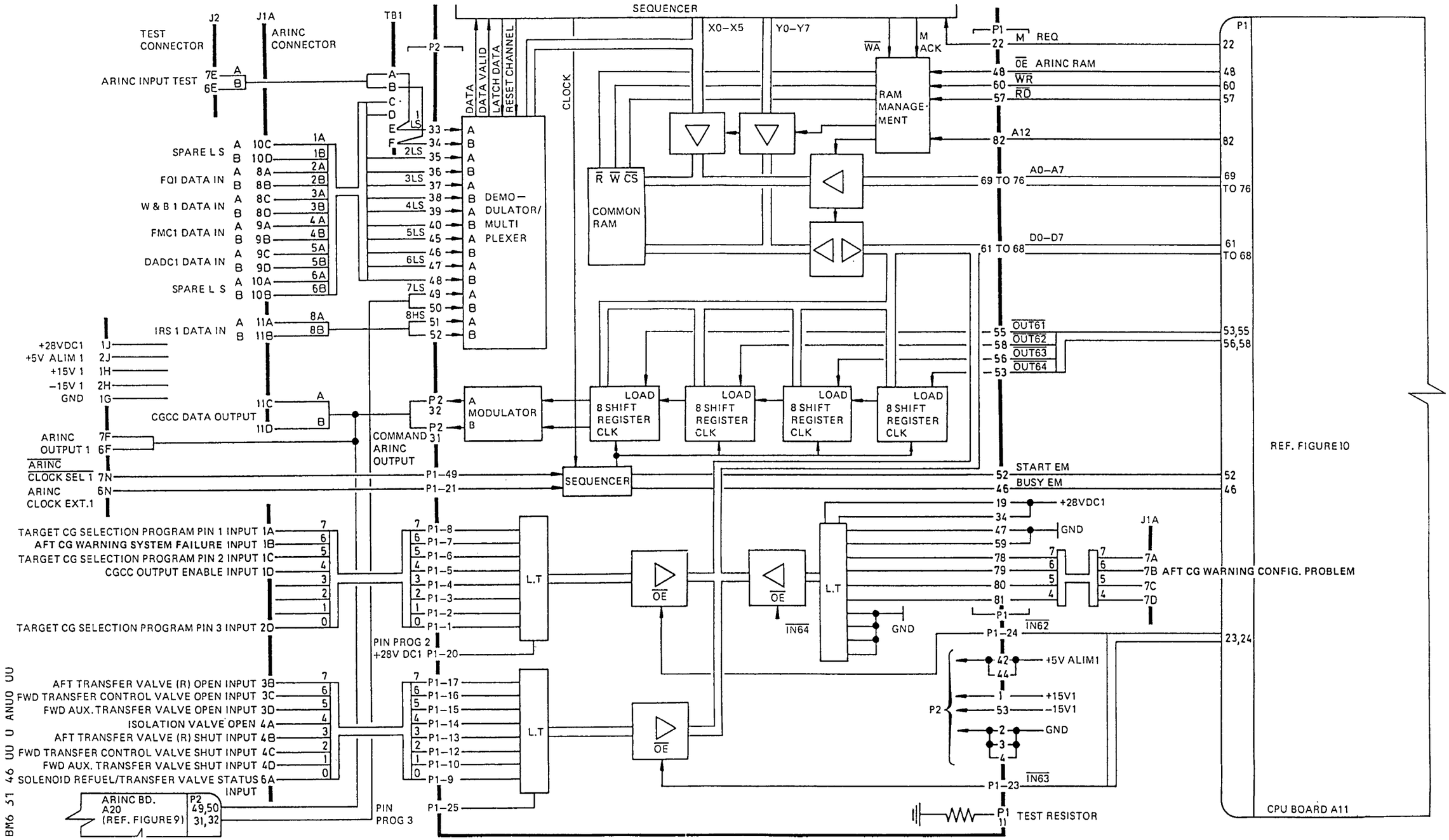
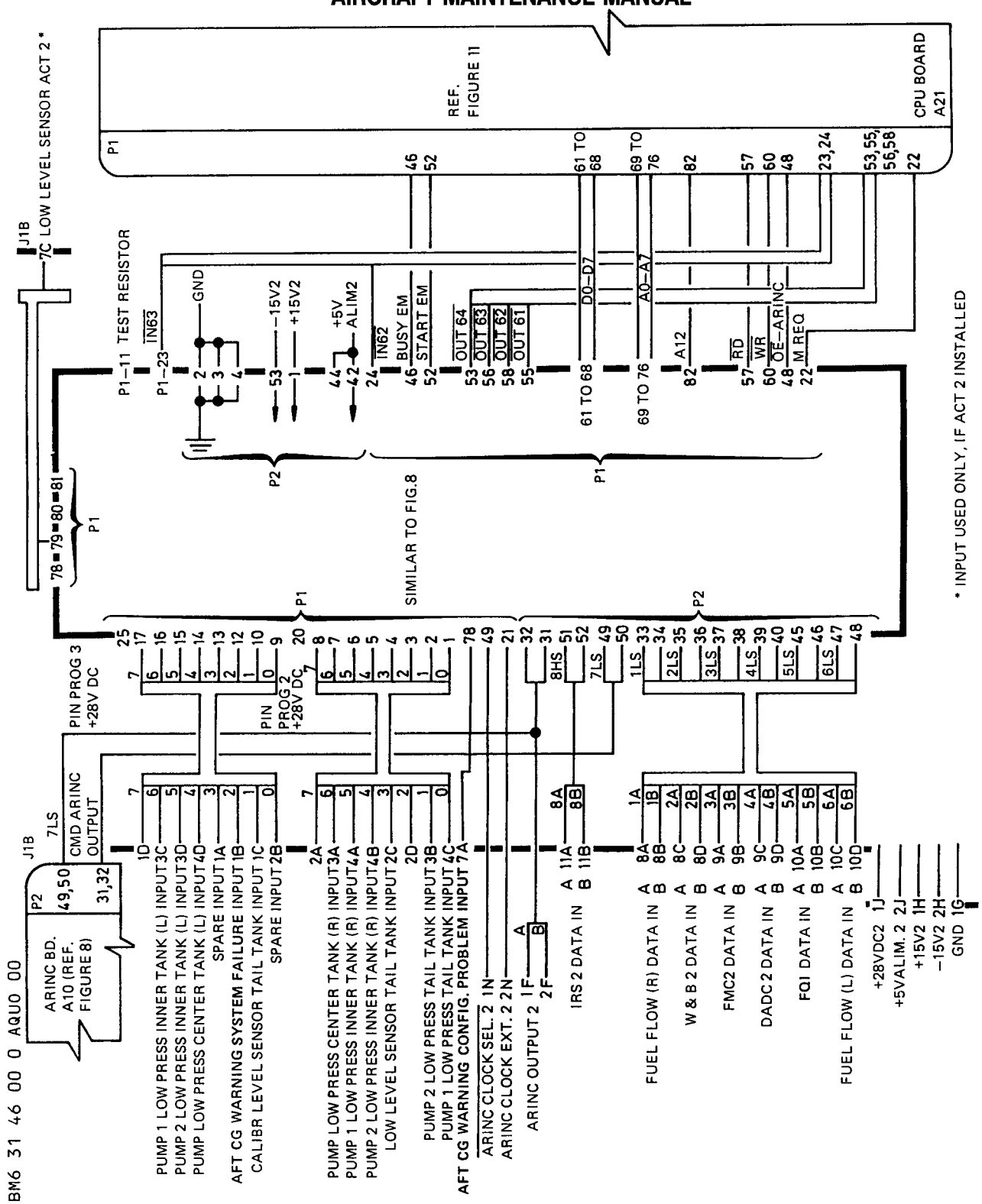


ARINC Board A10 Schematic
Figure 008



ARINC Board A20 Schematic
Figure 009

(b)CPU Boards

**ON A/C 101-200,

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(Ref. Fig. 010) (Sheet 1 of 2)

**ON A/C 101-200,

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(Ref. Fig. 010) (Sheet 2 of 2)

**ON A/C 101-200,

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(Ref. Fig. 011)

**ON A/C 101-200,

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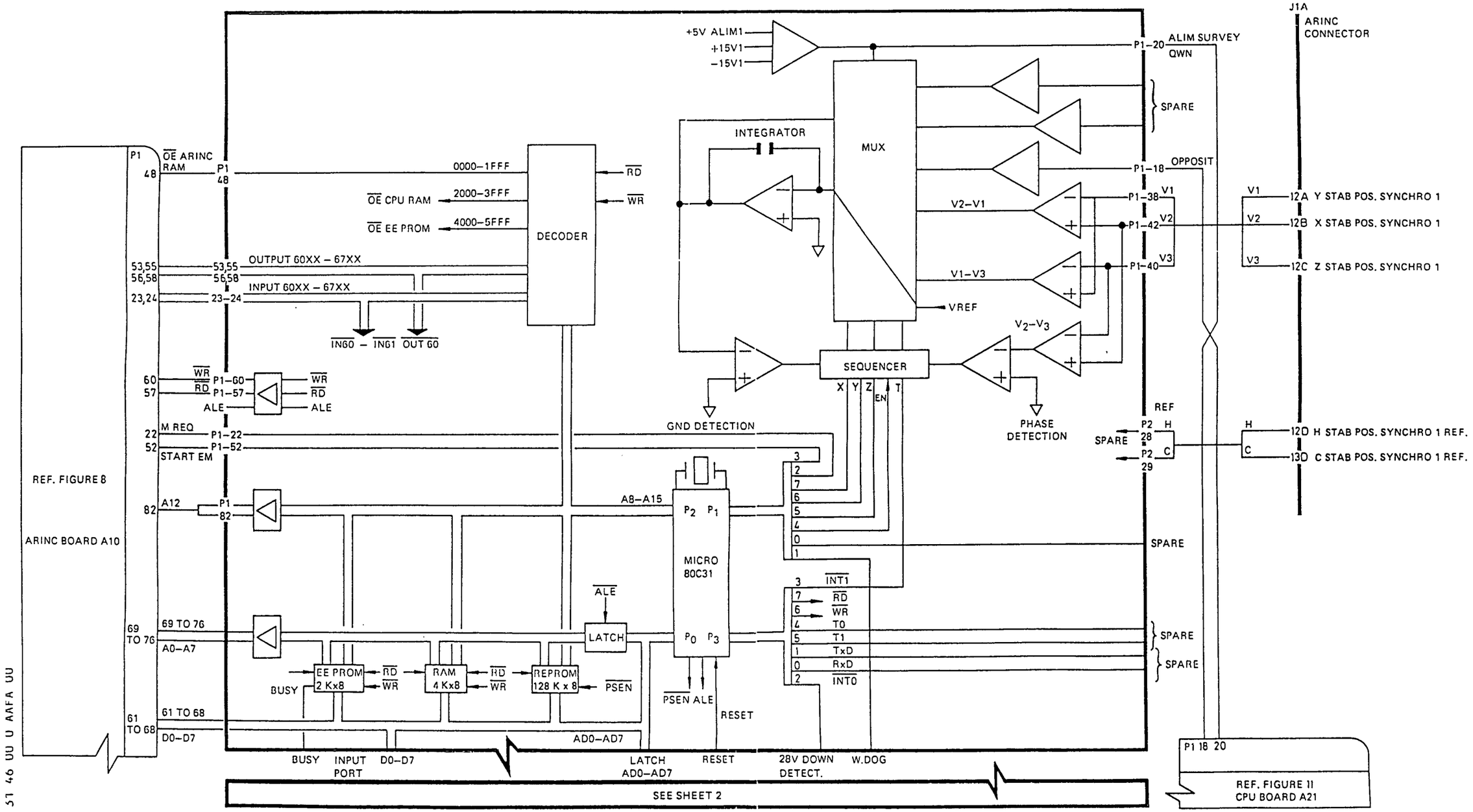
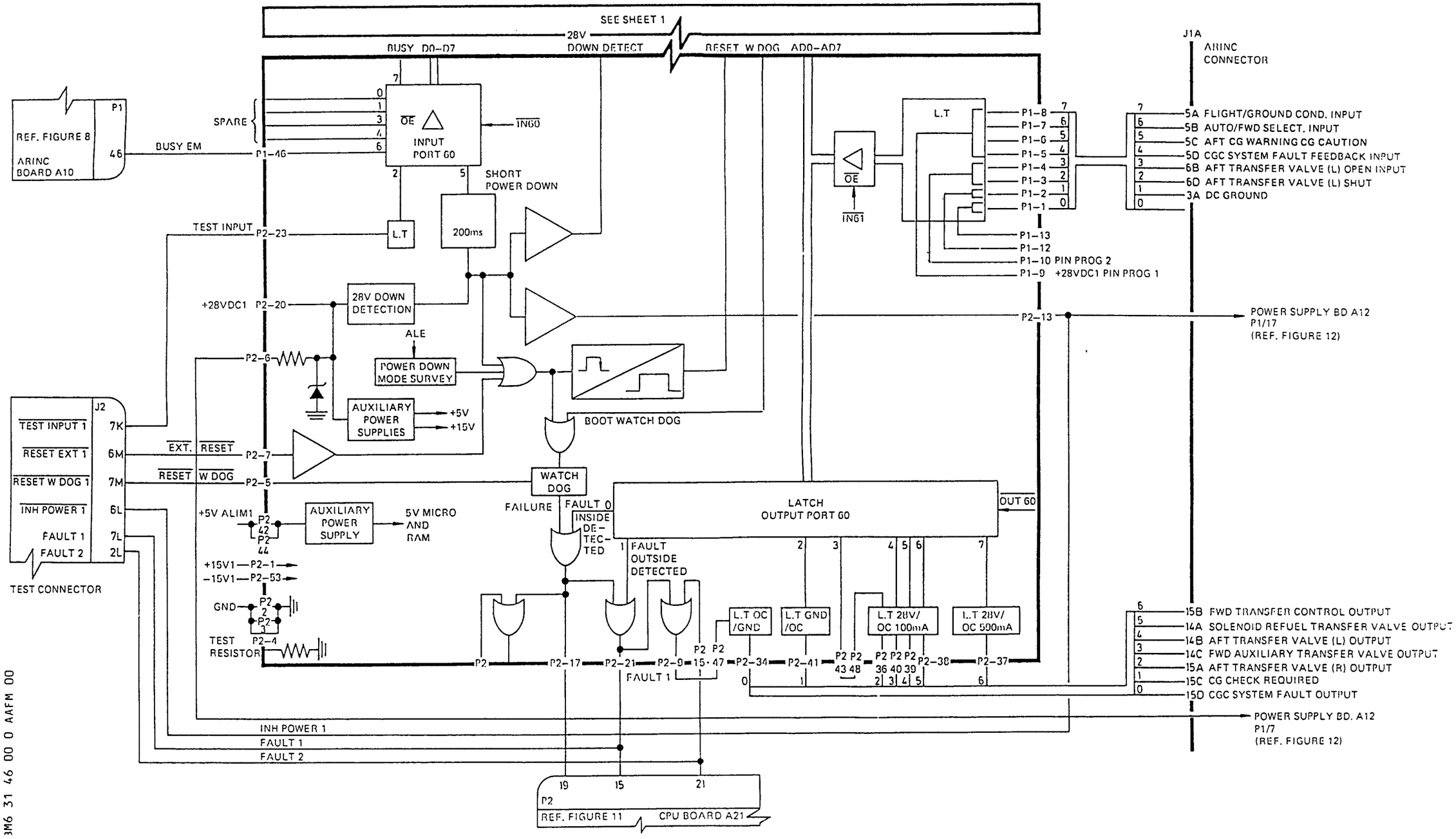
Each CPU board consists basically of a digital core, an analog-to-digital conversion system and various peripherals, microcontroller, reset circuits, watchdog and control logic.

- The digital core contains:
  . the 8-bit microcontroller (with 128 bytes of protected internal RAM and with two timers)
  . 128 KBytes of EEPROM
  . 6 KBytes of external memory (4 KBytes of protected RAM and 2 KBytes of EEPROM)
  . input/output ports: ports P1 and P3 inside the microcontroller, one external input port (port 60)
  . 16 address lines and a decoder for the external memories, for the input ports (IN60 to 63), for the output port (OUT60) and for the ARINC transmission (OUT61 to 64).
- The analog-to-digital converter transforms the angular data output by the synchro into digital form. The microcontroller timer counts the pulses representing the digital equivalent of the voltage acquired.
- Microcontroller reset circuits: they are activated at power-up by the power-down detection system, by an external reset from the test connector, or by a monitoring system of the power-down mode of the microcontroller.
- In the event of a power failure, the reset system is disabled by the



CPU Board A11 Schematic (Sheet 1 of 2)
Figure 010



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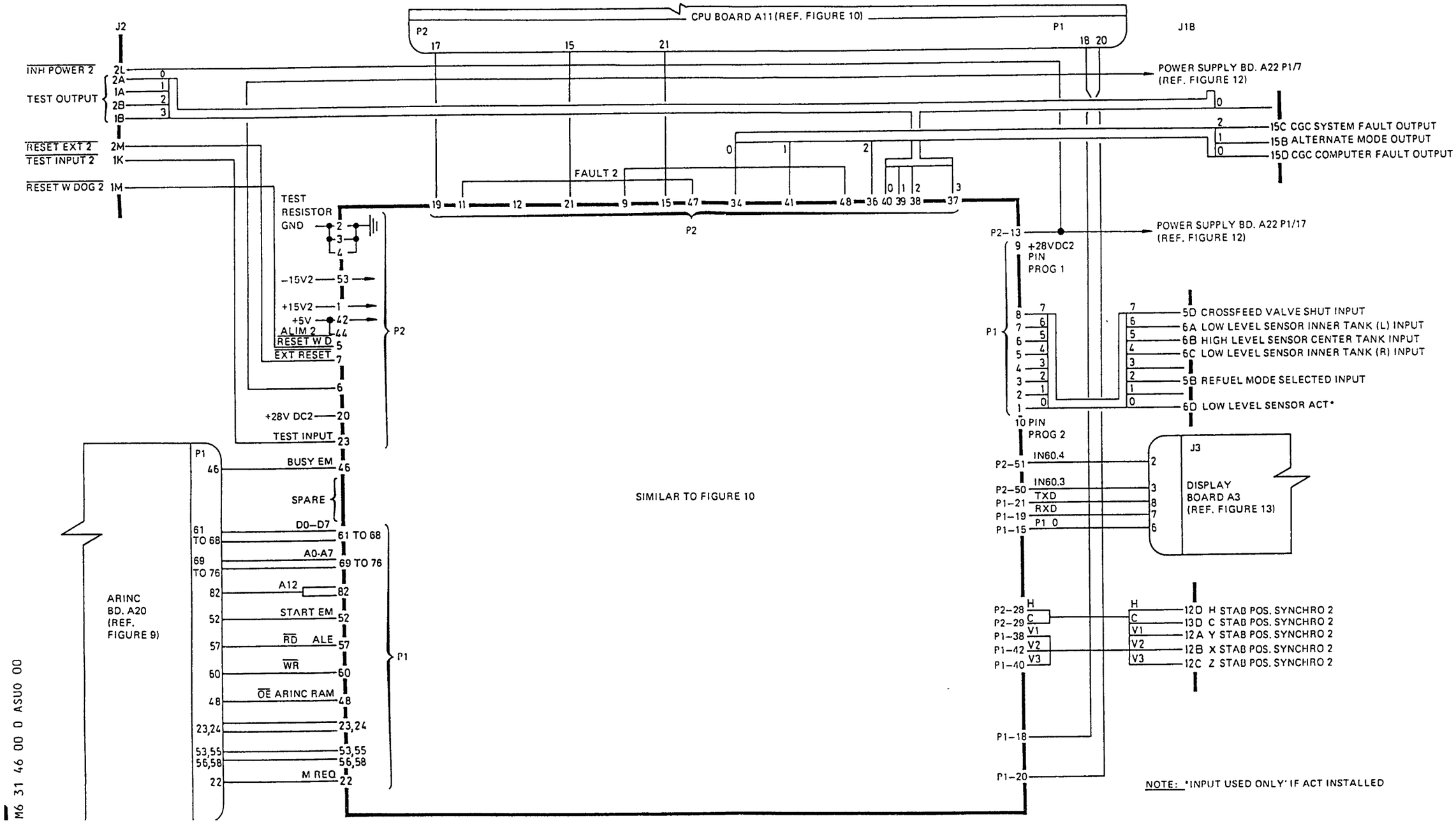
CPU Board A11 Schematic (Sheet 2 of 2)
Figure 010



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CPU Board A21 Schematic
Figure 011

power-down detection system in order to allow the microcontroller to put itself into power-down mode.
- Watchdog: the watchdog is rearmed cyclically by the microcontroller (**BOOT WATCH DOG** signal) from the test connector.
  In the event of non-rearming, the watchdog sends fault data to the control logic. The fault data is stored in a flip-flop which is initialized at power-up during operation by an external command (**RESET WATCH DOG** signal) from the test connector.
- Control logic: this generates the fault data to be transmitted to the opposite side and also to the external annunciation.

Each **CPU** board also contains the following power supply and monitoring circuits:
- a separate circuit supplying the microprocessor and the **RAM** which, in the event of a short power-down, holds the voltage in the region of **5 V** for over **200** ms in order to protect the data contained in the **RAM**,
- a standby power supply which provides two voltages to the power-down detection system: **+15 V** for the analog part and **+5 V** for the digital part,
- a circuit for monitoring the **28 V**, which enables the system to survive short power-downs of the **28 V DC** switching the system over to standby and protects the data contained in the **RAM**,
- a global monitoring system for the three supply voltages: **+15 V**, **-15 V** and **+5 V**, the result of which is taken into consideration on both channels by means of the synchro-to-digital converters.

NOTE : CGCC Power Up Test
During power-up, the CGCC checks the CGC SYSTEM FAULT output. For this purpose, the computer sends a signal from the fault output (1GU/AA-15D) to the fault feedback input (1GU/AA-5D). It sets and resets the fault output and checks the signal change on the feedback input.
The power-up test does not run if during the test:
- one or both FWC illuminate the FAULT lamp in pushbutton 3GU on fuel-control panel 430VU,
- the isolation valve control logic illuminates the FAULT lamp,
- the button itself is pushed.

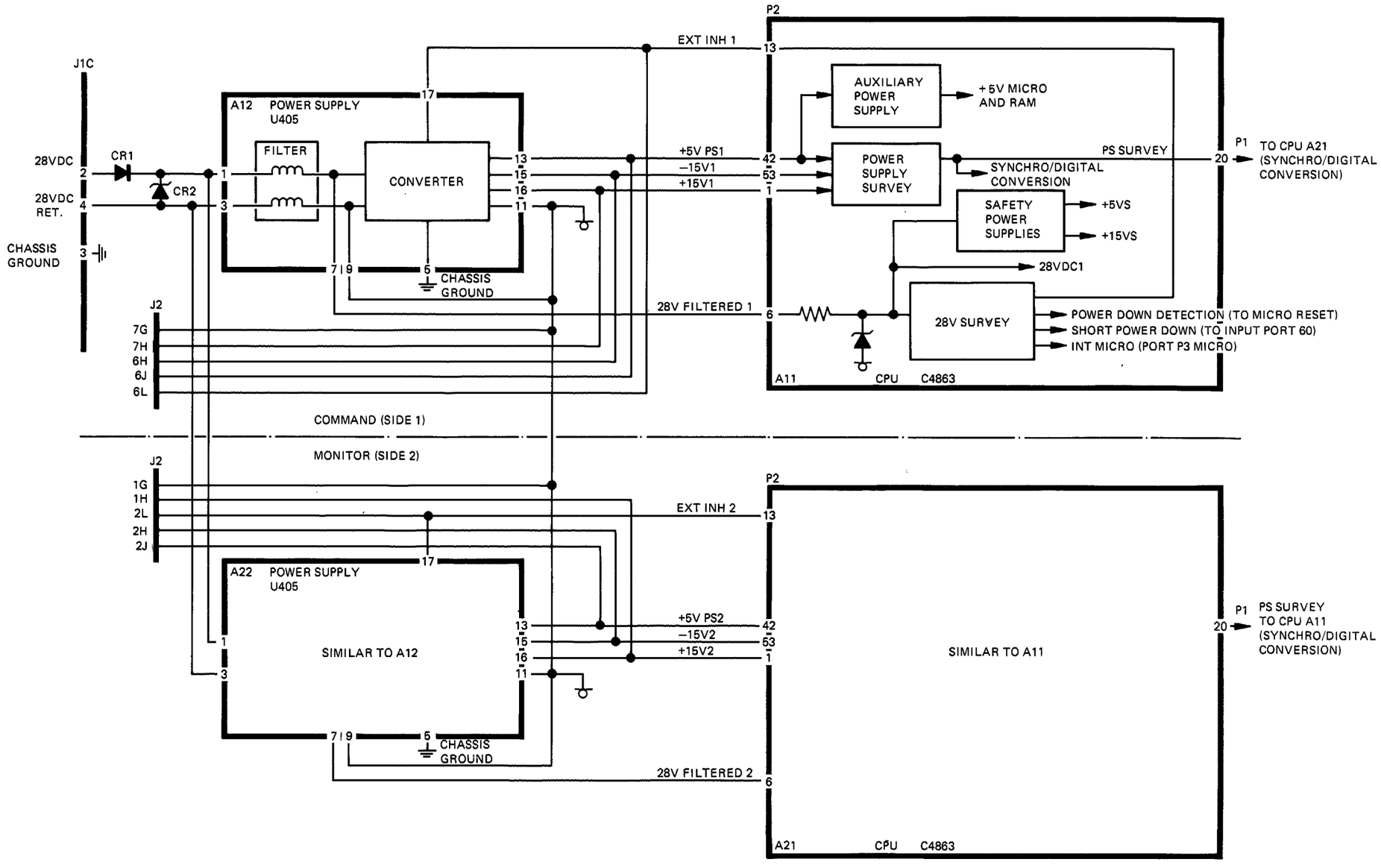
In these cases the CGCC does not enter the normal CG control. It illuminates the FAULT lamps in the pushbuttons 3GU on panels 430VU and 4GU on the maintenance panel 472VU. An availability test or flight history test is not possible under these conditions.

(c)Power Supply Boards

**ON A/C 101-200,

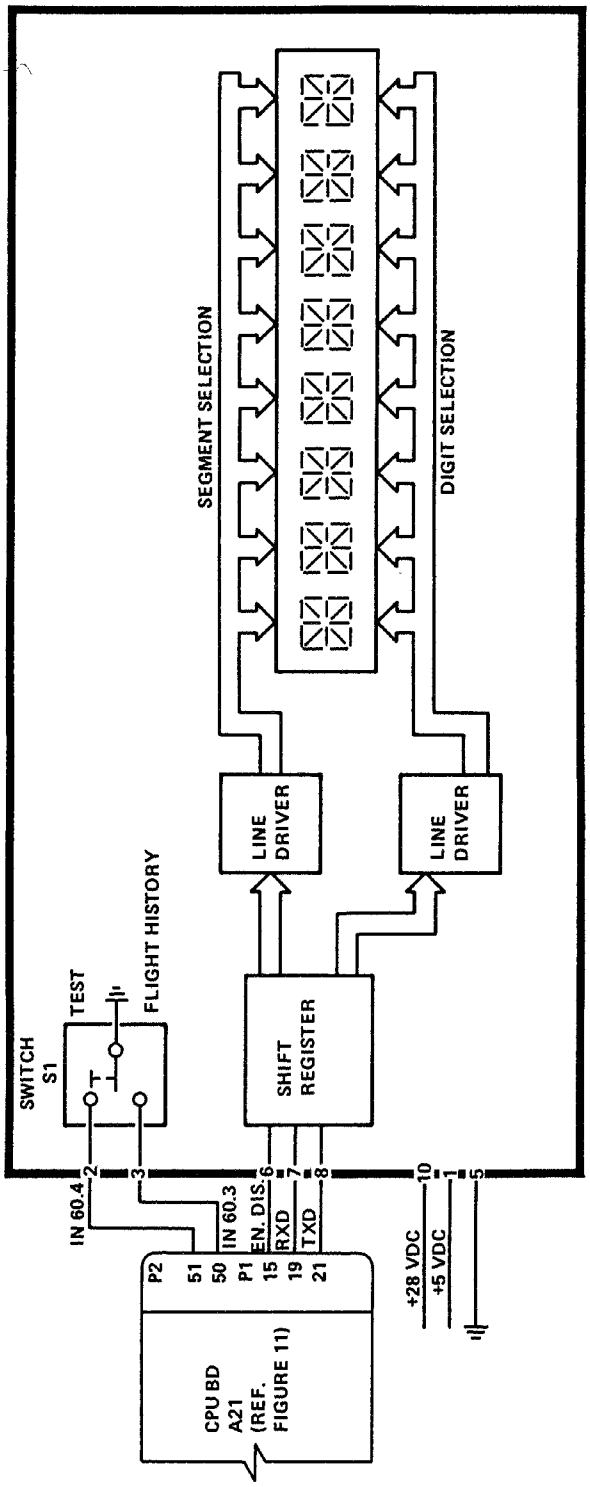
(Ref. Fig. 012)
Each power supply board contains a DC to DC converter which is powered from the aircraft 28 V DC supply via bus 308PP and circuit breaker 2GU or via bus 901PP and circuit breaker 6GU. Both converters provide the necessary voltages of +5 V and ±15 V DC for system operation. The voltages are monitored by circuits on the CPU boards.

(d)Display Board
(Ref. Fig. 013)
With the aircraft on the ground, a display of faults which occurred during the last or preceding flights and/or the results of a CGCC availability test can be selected and is shown on a display board (BITE display) on the computer front panel. Selection of either display is made by means of the display switch, also located on the computer front panel.
The information to be displayed is transmitted in serial form from the microprocessor of the monitor channel to the display board. It is stored into shift registers and then clocked out in digits and segments via a number of line drivers. The display consists of 8 digits, each with 16 segments, and a character is defined by three bytes (24 bits). Thus, 24 bytes are necessary for the activation of all 8 digits.



BM3 31 46 00 0 AUM0 21

CGCC Power Supply Boards
Figure 012



BM3 31 46 00 0 AWM0 21

Display Board A3 Schematic
Figure 013

B. TRIM TK MODE pushbutton (3GU)
(Ref. Fig. 014)

**ON A/C 101-200,

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The TRIM TK MODE pushbutton is an illuminated pushbutton switch indicator located on fuel control panel 430 VU.
The FAULT caption is illuminated amber if the P/BSW is in the AUTO position and if any of the following failurs occur:
- a CGCC fault,
- absence of initial ZFW or ZFCG values after takeoff,
- CG moves aft of target CG (target value plus 0.3 % MAC for flights above FL 205),
- detected transfer system faults during alternate mode 1,
- detected FQI faults during alternate mode 2,
- loss of A/C power (no CGCC fault, only the FAULT caption is illuminated by busbar 901PP),
- failure caused by one of the following manual operations:
  - trim tank pumps switched off or manual FWD transfer commanded during alternate mode,
  - if after an executed manual FWD transfer (system switched back to normal mode) an alternate mode occurs while the CGCC commands an aft transfer.

NOTE : The FAULT caption is also illuminated by a signal from the FWS if both trim tank pumps fail or if the trim tank isolation valve fails to open or if 40.8 % MAC are exceeded.

Should any of the above failures occur, a warning message is displayed on the LH ECAM Display for flight crew information. Besides, a respective failure indication is shown on the FUEL page of the RH ECAM Display.
Manual fuel flow control in the FWD direction is obtained by pressing the switch in. The FWD caption is then illuminated.

**ON A/C 101-200,

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C. FAULT Light (4GU)

**ON A/C 101-200,

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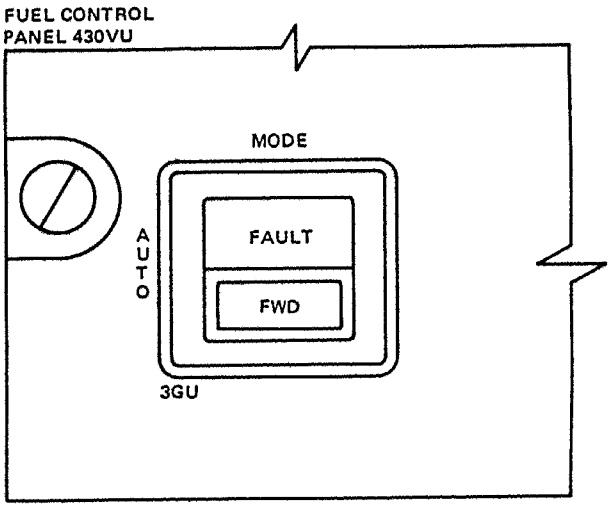

BM3 31 46 00 0 AYM0 25

TRIM TK MODE pushbutton
Figure 014

(Ref. Fig. 015)

**ON A/C 101-200,

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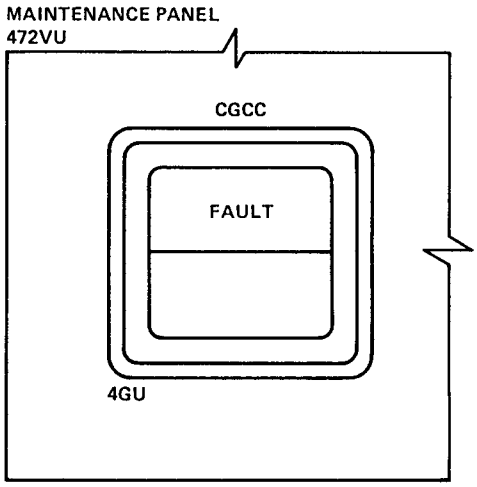
The FAULT light is illuminated when a CGCC internal failure has been detected. If indicates that the CGCC should be removed for test and maintenance procedures.
The light is also illuminated if the TRIM TK MODE pushbutton is pressed to FWD during the power up to the CGCC. In this case all digits of the CGCC BITE display are also illuminated.



BM6 31 46 00 0 BAU0 00

FAULT Light
Figure 015

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**ON A/C 101-200,

5. System Operation

A. Normal Operation
(Ref. Fig. 016)
(Ref. Fig. 017)

**ON A/C 101-200,

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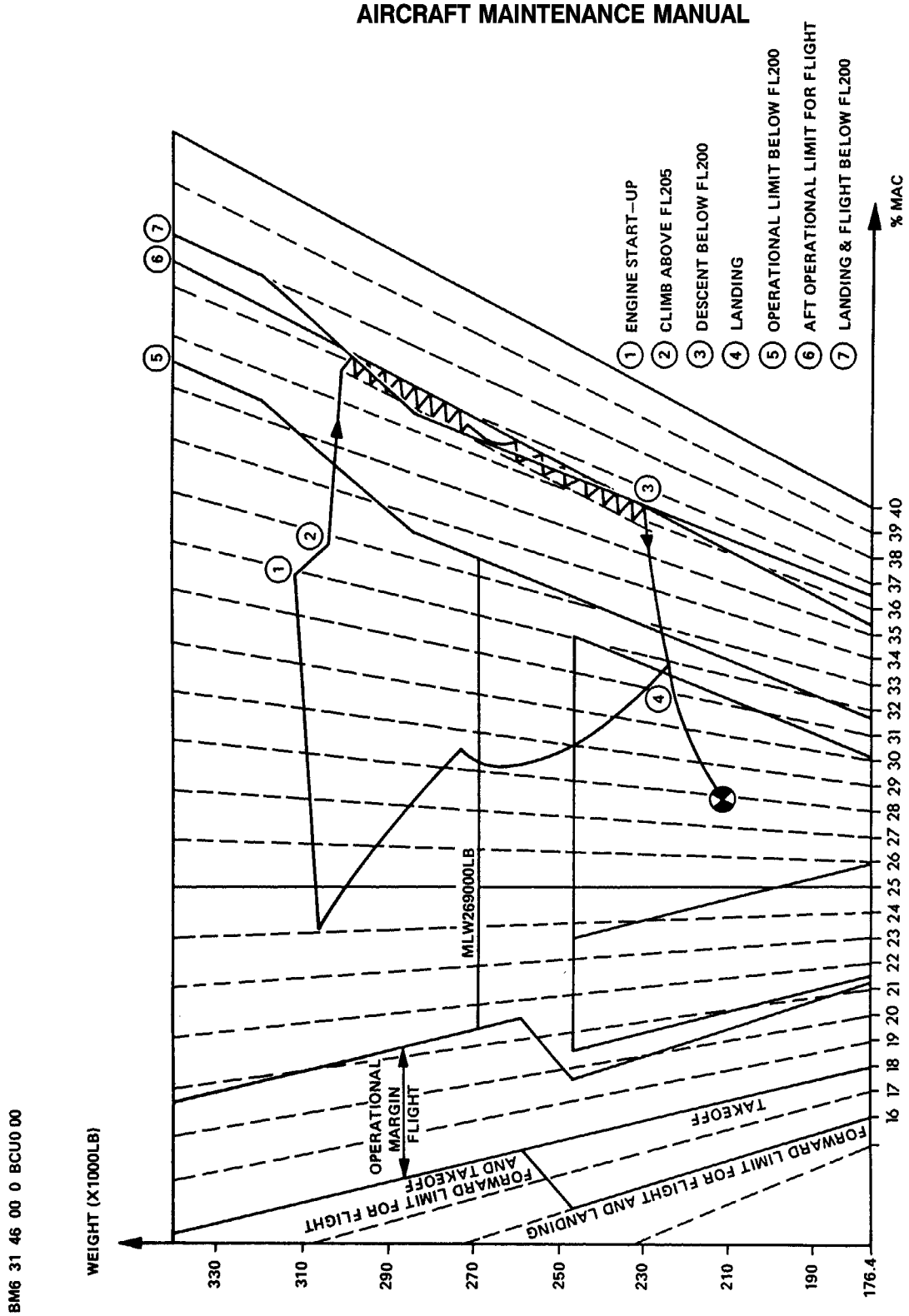
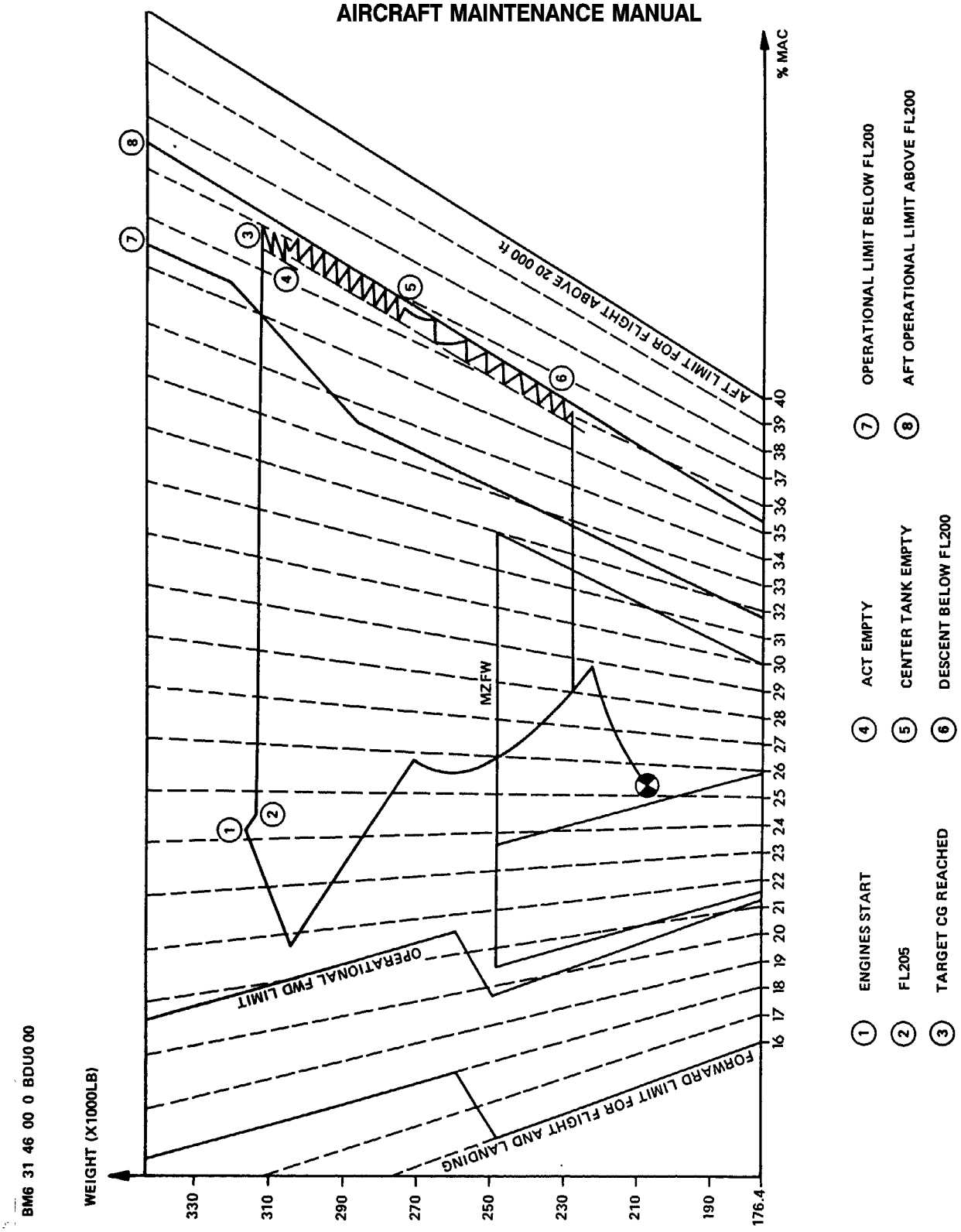
Automatic operation of the CGCS is achieved when either one or both of the TRIM TK PUMP LOPR/OFF switches on the Fuel Control Panel are pressed to the 'in' position and the TRIM TK MODE switch is in the 'out' position. The system is then armed and the valves and pumps of the transfer system will operate from command signals issued by the CGCC command channel to transfer fuel in either the FWD or aft direction in order to obtain the target CG. The CG position is computed from input data received from the FQI computer and from aircraft pitch attitude received from the IRS. The target CG is achieved by the transfer of fuel in the aft direction from the center or inner wing tanks to the trim tank and in the FWD direction from the trim tank to the center tank. The monitor channel of the CGCC monitors the command channel as well as the transfer system to make certain that the CG is always maintained within safe limits even under degraded system performance.
As long as the A/C is on the ground, there is no CG control. The computer accepts the FQI data as well as the primary WBS data or data from the load and trim sheet. Load and trim sheet data which must be input before takeoff on the CDU's of the FMS, to enable the CGCC compute the actual CG location.
The target CG for flight levels below FL 200 is 31.81 % MAC at 80 t to 33.58 % MAC at 128.6 t to 35.41 % MAC at 145 t to 35.5 % MAC at 150 t.
After take-off and with the isolation valve open the CGCC takes care that the target CG for flights below FL 200 is not exceeded.
If the A/C reaches FL 205 the CGCC starts an aft transfer to get the aft target CG.
Above FL 205 the CG is maintained within 0.5 % MAC forward of a target CG of 37.5 % MAC minus CG for 150 t and 35.3 % MAC minus CG for 80 t with linear variation in between by using normal FWD transfer as long as fuel loading allows this.
Delta CG is a safety margin that defines operational limits. The operational limits vary with the airline load and trim sheet procedure. As programmable inputs the airline may select delta CG by the use of CGCC program pins. The selected margin remains constant during the flight for the specific aircraft.
A fast forward transfer is initiated by the CGCC if the target CG is overrun by more than 0.1% MAC.


① ENGINE START–UP
② CLIMB ABOVE FL205
③ DESCENT BELOW FL200
④ LANDING
⑤ OPERATIONAL LIMIT BELOW FL200
⑥ AFT OPERATIONAL LIMIT FOR FLIGHT
⑦ LANDING & FLIGHT BELOW FL200
% MAC
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
MLW269000LB
OPERATIONAL MARGIN FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
TAKEOFF
WEIGHT (X1000LB)
330 310 290 270 250 230 210 190 176.4
BM6 31 46 00 0 BCU0 00

CGCS Normal Operation without ACT
Figure 016



CGCS Normal Operation with ACT
Figure 017

NOTE : If the CGCC is not able to acquire a target CG because the trim tank has reached high level, CG control is interrupted and resumed automatically when the target CG is reached by fuel consumption out of the basic tank system.

The Auto Fuel Feed Logic switches over from center to inner tank feeding, if the calibration sensor in the center tank becomes dry during CG control.
The CGCC makes normal FWD transfers in steps of 500 kg. The computer does this when one of the inner tanks is empty and the fuel in the center tank falls to 500 kg until the trim tank is also empty.

The CG control is normally terminated when the A/C passes FL 200 on its descent. Then all remaining trim tank fuel is transferred into the center tank using fast FWD transfer. This transfer is also initiated by the CGCC which takes care that neither the FWD CG limit is exceeded nor the center tank is overfilled.
If power is switched off after refueling or landing, the CGCC is able to enter normal control mode after power-up. The computer therefore stores the validated FQI values after refueling or the monitored fuel quantity values after landing in a nonvolatile memory if the fuel flow decreases below 100 kg/h.
If thereafter the APU is running, the stored fuel quantity values are updated whenever the estimated APU fuel consumption reaches 50 kg until engine start-up.
At the end of a flight the CGCC stays in normal mode when the outer tanks are normally used and the trim tank is empty. It remains also in normal mode if during refueling more than 200 kg are in the trim tank and if the amount of fuel in the outer tanks is below 2500 kg. In all other cases it enters alternate mode when the amount of fuel in the outer tanks decrease below 2.5 t.

B. Alternate Mode

The CGCC uses a so called 'alternate mode' to control the CG when a failure in the transfer or the other related systems leads to degraded system performance. The system distinguishes between two types of failures which will both cause the CGCC to enter the alternate mode.
Type 1 failures:
During type 1 failures the FWD fuel transfer rate is limited to the engine burn rate, because the overfill protection of the center tank based on the FQI data is not possible.

In the present system configuration the only type 1 failure occurs, if the FQI fails.

**ON A/C 101-200,

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Type 2 failures:
During type 2 failures the forward transfer control valve and the FWD auxiliary transfer valve are used during forward transfers. Prevention of center tank overfilling is based on FQI center tank indication.
The following failures are classified as type 2 failures:
- solenoid refuel transfer valve fails to open or close,
- FWD transfer control valve fails to open,
- FWD transfer control valve fails to close,
- FWD auxiliary transfer valve fails to open,
- one aft transfer valve fails to close or open,
- both trim tank pumps fail,
- FWD auxiliary transfer valve fails to close.

- both DADC fail,
- both FFI fail (possible only on the ground!)
- AFT CG warning configuration problem,
- AFT CG warning system failure.

NOTE : If the FWD transfer control valve or the auxiliary transfer valve fail to close, the CGCC opens both transfer valves to inhibit fuel transfer by gravity when no transfer is required.

The failures mentioned above cause the computer to initiate an alternate mode warning on the ECAM Displays. The LH ECAM Display shows the message TRIM TK AFT XFR NOT AVAIL and on the RH ECAM Display a respective change of the FUEL page synoptic is shown. The ECAM shows the alternate mode warnings also on the ground independent of the engine fuel flow. Depending on the failure type and with respect to the ZFCG, the CGCC initiates one of the following transfer procedures:

A1 Failure type 1; ZFCG in area 'A'

**ON A/C 101-200,

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(Ref. Fig. 018)

**ON A/C 101-200,

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(Ref. Fig. 019)

**ON A/C 101-200,

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(Ref. Fig. 020)

**ON A/C 101-200,

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(Ref. Fig. 021)

**ON A/C 101-200,

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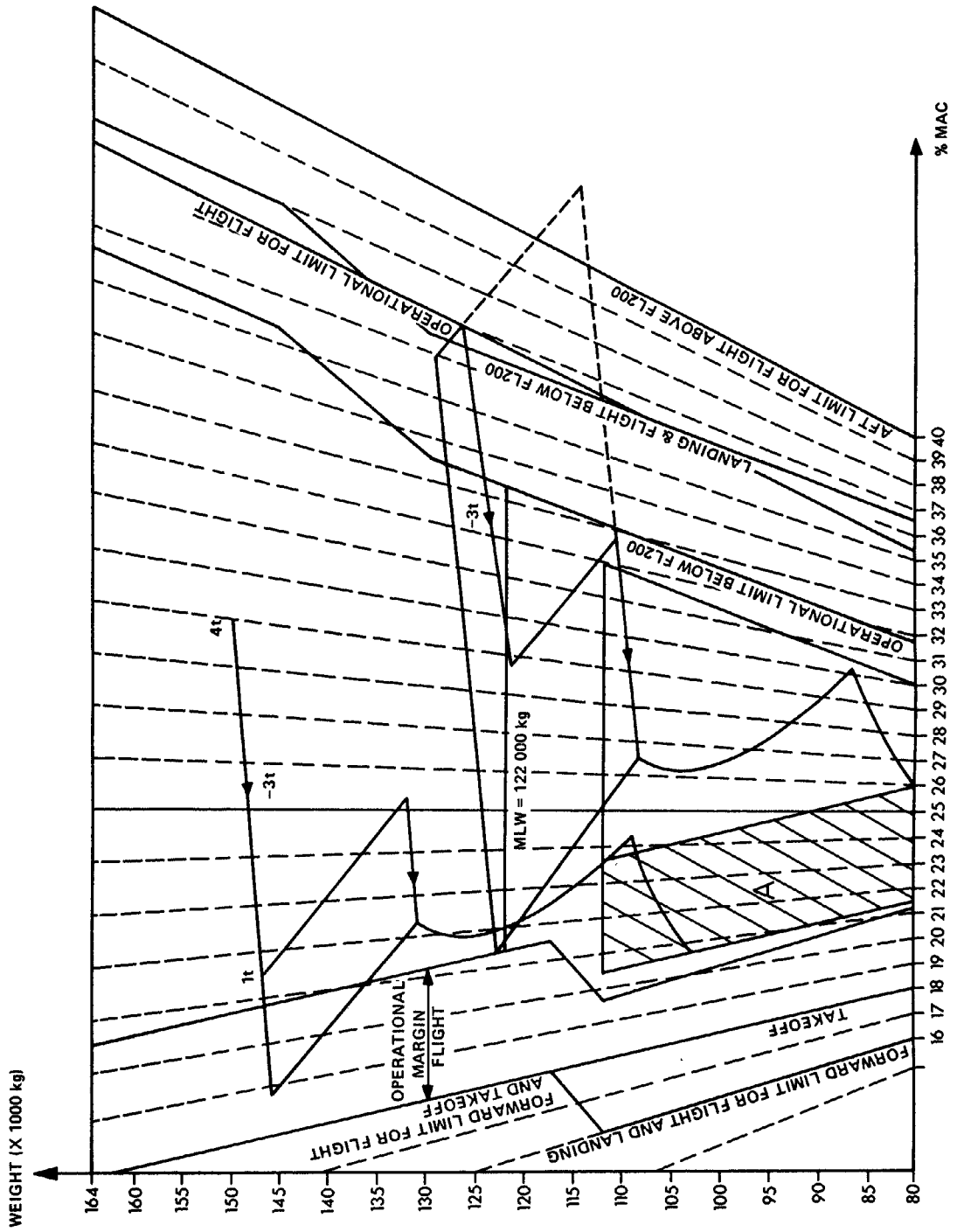
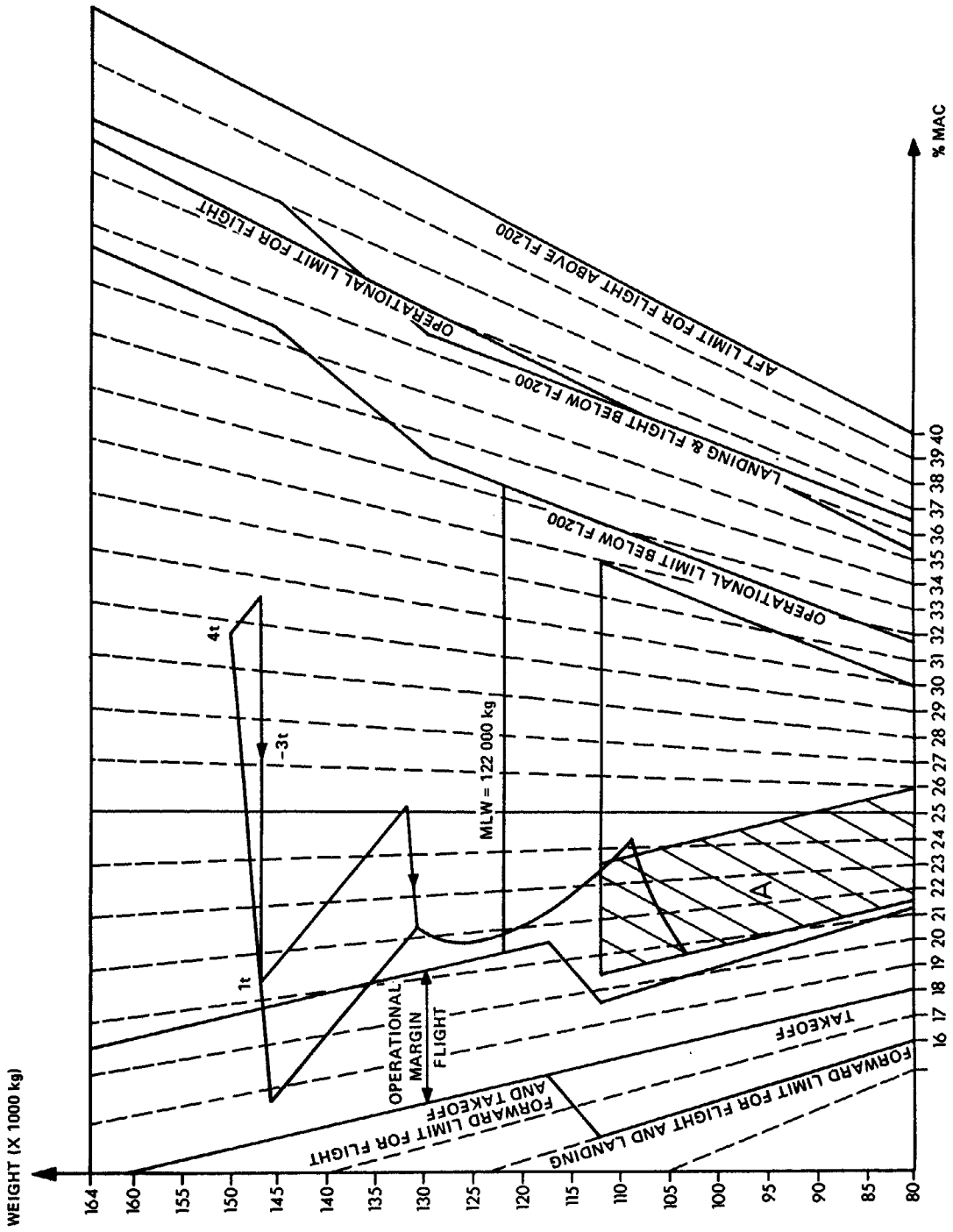

% MAC
AFT LIMIT FOR FLIGHT ABOVE FL200
OPERATIONAL LIMIT FOR FLIGHT
LANDING & FLIGHT BELOW FL200
OPERATIONAL LIMIT BELOW FL200
-3t
4t
-3t
1t
MLW = 122 000 kg
OPERATIONAL MARGIN FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
TAKEOFF
WEIGHT (X 1000 kg)
164 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

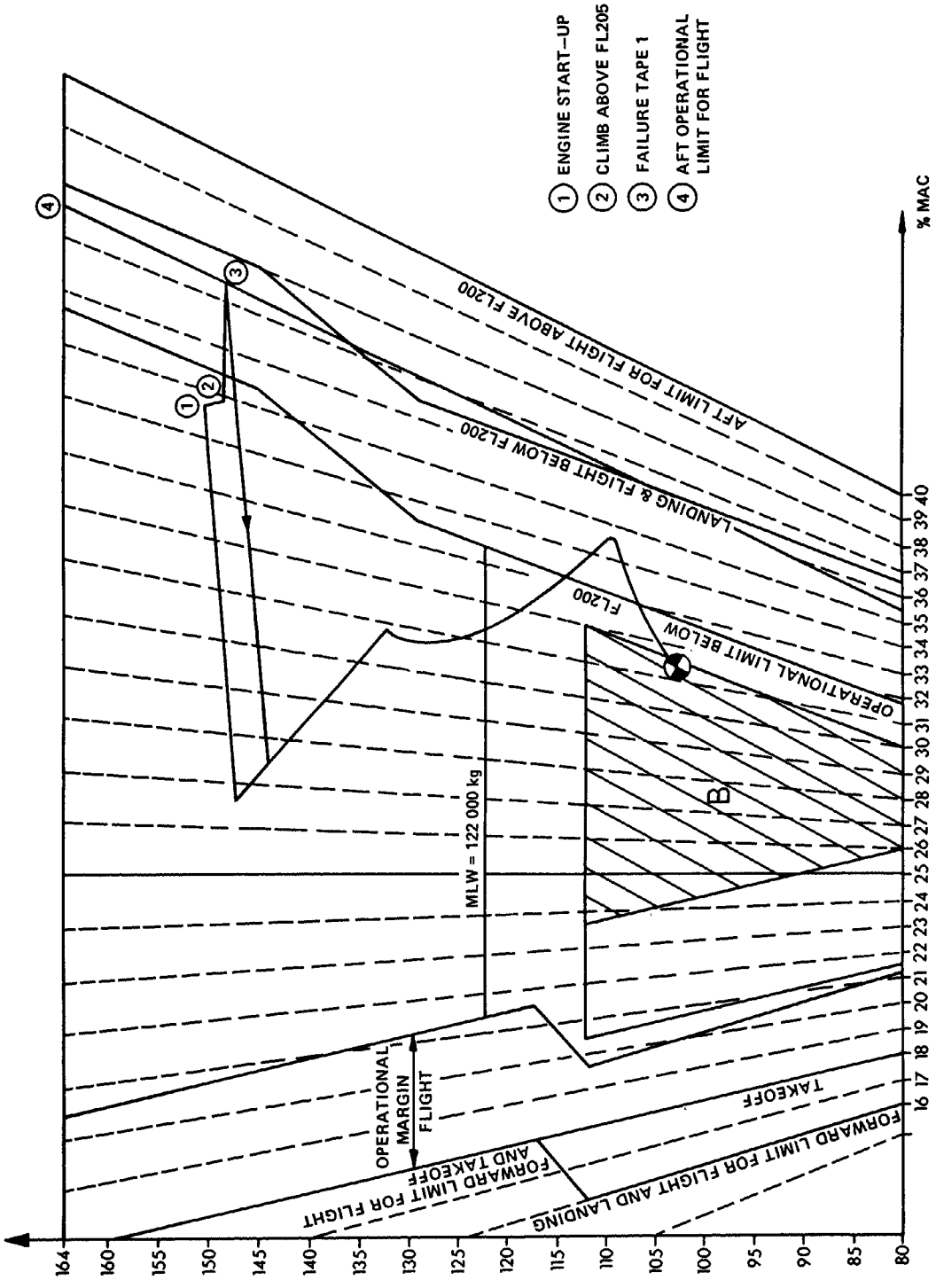
BM3 31 46 00 0 BEND 00

Alternate Mode Failure Type A1
Figure 018


AFT LIMIT FOR FLIGHT ABOVE FL200
OPERATIONAL LIMIT FOR FLIGHT
LANDING & FLIGHT BELOW FL200
OPERATIONAL LIMIT BELOW FL200
MLW = 122 000 kg
4t
-3t
1t
OPERATIONAL MARGIN
FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
TAKEOFF
% MAC
WEIGHT (X 1000 kg)
164 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

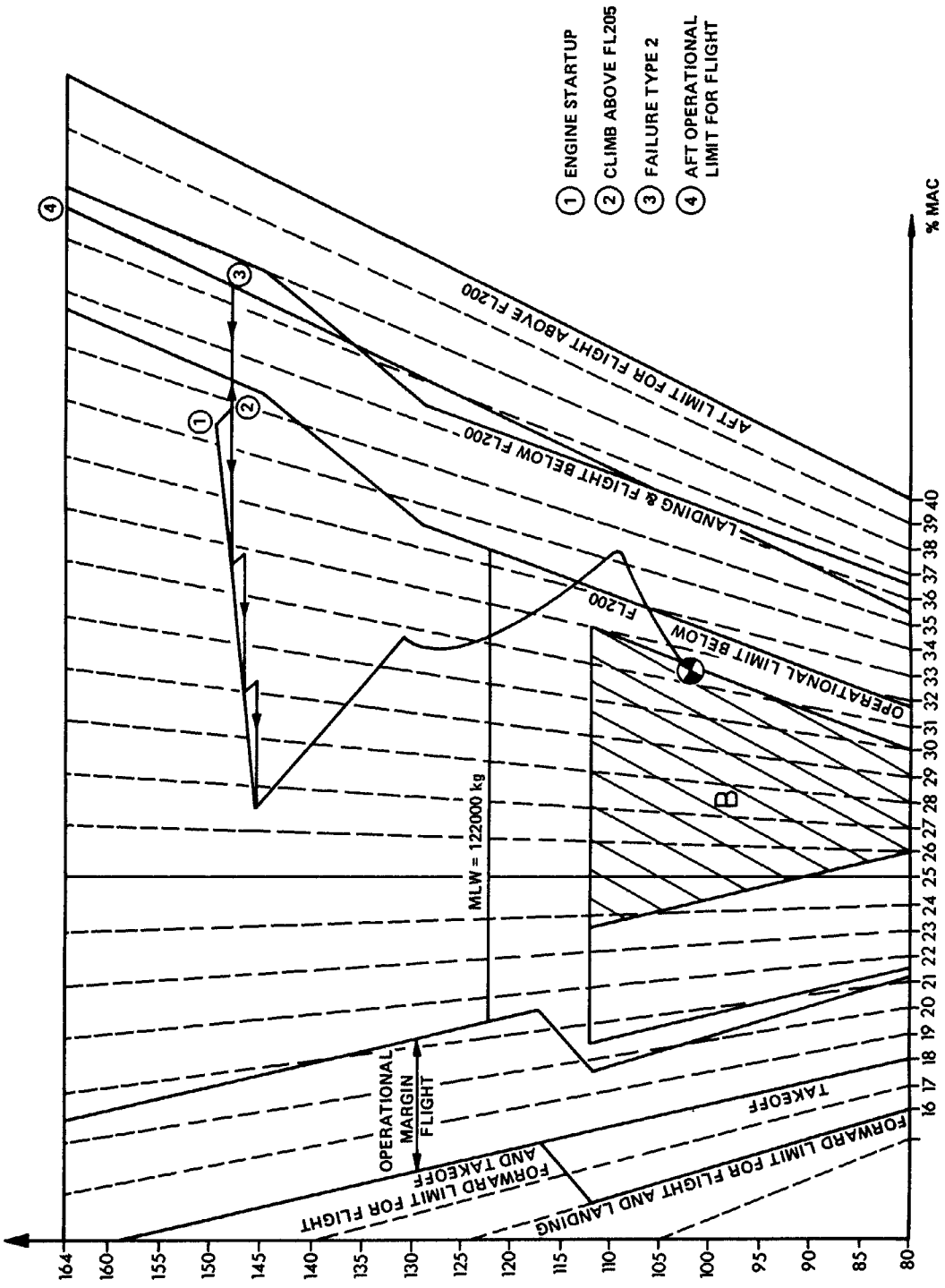
BM3 31 46 00 0 BGN0 00

Alternate Mode Failure Type A2
Figure 019


① ENGINE START-UP
② CLIMB ABOVE FL205
③ FAILURE TAPE 1
④ AFT OPERATIONAL LIMIT FOR FLIGHT
AFT LIMIT FOR FLIGHT ABOVE FL200
LANDING & FLIGHT BELOW FL200
FL200
OPERATIONAL LIMIT BELOW
B
MLW = 122 000 kg
OPERATIONAL MARGIN FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
TAKEOFF
% MAC
WEIGHT (X 1000 kg)
164 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

BM3 31 46 00 0 BJN0 00

Alternate Mode Failure Type B1
Figure 020


① ENGINE STARTUP
② CLIMB ABOVE FL205
③ FAILURE TYPE 2
④ AFT OPERATIONAL LIMIT FOR FLIGHT
AFT LIMIT FOR FLIGHT ABOVE FL200
LANDING @ FLIGHT BELOW FL200
FL200
OPERATIONAL LIMIT BELOW
MLW = 122000 kg
B
OPERATIONAL MARGIN FLIGHT
FORWARD LIMIT FOR FLIGHT AND TAKEOFF
TAKEOFF
FORWARD LIMIT FOR FLIGHT AND LANDING
% MAC
WEIGHT (X 1000 kg)
164 160 155 150 145 140 135 130 125 120 115 110 105 100 95 90 85 80
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

BM3 31 46 00 0 BLN0 00

Alternate Mode Failure Type B2
Figure 021

The CGCC initiates a two-step fuel transfer. During the first step 3 t of fuel are transferred into the center tank when the failure is detected. The fuel quantity determination within the CGCC is based on time. During the FWD transfer the CGCC stops the transfer for two minutes and 45 seconds if the center tank high level sensor gets wet. During the second step, the remaining trim tank fuel is transferred when the center tank is empty. To detect this, the computer uses the pump running signals of the center and inner wing tanks.

A2 Failure type 2; ZFCG in area 'A'
As for type 1 failures, the CGCC initiates a two-step fuel transfer. For the first step the computer waits until the center tank fuel decreases to 12.4 t, then it transfers 3 t of fuel into the center tank on the base of FQI quantity determination. When the center tank is empty, the remaining trim tank fuel is transferred.

NOTE : If the ZFCG is in area A, there have to be 4 tons minimum of fuel in the trim tank, if the center tank fuel vector is in front of the take off CG limit.
The limitation is necessary in order not to exeed the FWD CG limit under certain conditions in alternate mode of the CGCC.

B1 Failure type 1; ZFCG in area 'B' (Ref. Fig. 020)
The CGCC initiates a one step transfer from trim tank to center tank. The transfer starts immediately when the failure is detected. The computer monitors the trim tank fuel decrease as long as no FQI failures are present.

B2 Failure type 2; ZFCG in area 'B' (Ref. Fig. 021)
The transfer is started by the computer when the failure is detected. The fuel is transferred in steps. When the center tank fuel increases to above 15.4 t, the transfer is terminated. Then the computer repeats the fuel transfer every time when the center tank fuel decreases below 14.4 t.

The computer automatically re-enters normal mode when the A/C is on the ground and the failure condition is not present any longer.

C. Fault Mode

The CGCS enters the FAULT mode when one of the following failures occurs:
- CGCC failure,
- absence of initial ZFW or ZFCG values after takeoff,
- CG moves aft of target CG (target value for flights above FL 205 plus 0.3 % MAC),
- detected transfer system faults during alternate mode 1,
- detected FQI faults during alternate mode 2,
- failure caused by one of the following manual operations during an alternate mode in flight:
  - trim tank pumps switched off,
  - manual FWD transfer command

If the failure is not a detected computer fault the CGCC stops any fuel transfer. It activates the FAULT lamp on the fuel control panel and sends a warning message to the ECAM displays.
The LH ECAM Display shows then the message TRIM TK SYS FAULT and the RH ECAM Display shows a respective change on the FUEL page synoptic.
In case of a computer failure, the CGCC FAULT lamp on the Maintenance Panel is also activated. CGCS- and CGCC faults which occur during flight are stored in the BITE memory of the computer for read-out by maintenance personel by means of a status history test.
If the fault on the ground is still effective, a message is shown during an availability test.
On the ground the fault mode disappears automatically if the fault condition is no longer present.
The CGCC will also enter the fault mode during power-up, if the FAULT lamp on the overhead panel is already illuminated by the FWC or the isolation valve control logic.
It does the same if the TRIM TK MODE P/B was operated to the "in" position and was not released before a new power-up. However the CGCC goes into the computer fault mode if this occurs. It illuminates the FAULT lamps on the maintenance and the overhead panel as well as all digits on the CGCC BITE display. The CGCC display will only reenter the normal mode, if the FAULT lamp on the overhead panel is not longer illuminated by the systems mentioned before or if the TRIM TK MODE P/B has released to AUTO.

To enter the normal mode a circuit breaker recycling for 2GU (FUEL TRIM TANK FWD XFR CGCC) on panel 22VU is necessary. These faults mentioned before will not leave a message in the CGCC BITE.

NOTE : The CGCS does not enter the FAULT mode under the subsequent circumstances:
- The actual A/C CG can temporary exceed the aft target CG caused by level changes above FL 205. In this case a delay logic inhibits the FAULT mode.
- A manual FWD transfer is possible on the ground in alternate mode.
- The actual A/C CG exceeds the AFT target CG by 0.1% MAC. The CGCC starts in this case a fast forward transfer. If the actual CG does not get to a position less than 0.3% MAC AFT within 120 seconds,the computer will go into its fault mode.

D. Manual Mode

The Center of Gravity Control System may be overridden by the crew.
To initiate a FWD transfer the TRIM TK MODE pushbutton must be in the 'in' position and the trim tank pumps must be selected by means of the TRIM TK PUMP pushbuttons on the Fuel Control Panel. The transfer control valve and the auxiliary transfer valve open and fuel is transferred into the center tank independently from any CGCC commands and from center tank high level signals. The forward transfer is indicated by illuminating the FWD caption of the TRIM TK MODE pushbutton. If a pump has been selected and is not delivering the correct pressure, the LOPR caption in the respective pushbutton is illuminated.
To stop any transfer, both TRIM TK PUMP pushbuttons must be selected off and the TRIM TK MODE pushbutton must be in AUTO.
All CGCC commands are then disabled and the pumps stop. The off state is indicated by the OFF caption of the respective button and on the LH ECAM display.
The CGCC will resume its CG control function if at least one TRIM TK PUMP pushbutton is selected on. If the trim tank contains fuel at re-initialization, the monitor thresholds of center and trim tank are extended (see 5.B) and the target CG above and below FL 205 is reduced by 1.5% MAC (see para. 3.A.). The thresholds remain unchanged if the trim tank low level sensor is dry and the FQI indicates trim tank empty.

**ON A/C 101-200,

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6. Test (Ref. Fig. 007, 013)

A. Test Facilities
A bite test of the CGCC itself and its related systems as well as a flight history test of the current status and the last five flights is possible with the A/C on the ground. For these tasks the computer is provided with a BITE-system consisting of:
- failure monitor circuits with appropriate BITE-software,
- eight-digit BITE-display for sequential read-out of detected faults,
- spring-loaded display-switch for selection of availability test or flight history test,
- non-volatile memory for the storage of failures, detected during a flight, for later read-out by means of the flight history test.

During the availability test, faults in peripheral devices are shown on LRU level. During a flight history test the non-volatile memory is checked for failures, stored by the CGCC Monitor to show the CURRENT STATUS, the LAST FLIGHT or the preceding four flights.

NOTE : The count of flight legs for the flight history is incremented by one every first time the engine fuel flow exceeds 100 kg/h between engines start-up and engines shut-down, even though the engines may have been used for ground operations only.

The test results are formed into messages and displayed on the BITE-display. The messages are shown in alphanumerical form and in a sequential order shifting from right to left on the eight-digit BITE-display. In general a message contains the flight number, a failure number and a failure message or, if no failure is detected, a no-failure message. The availability test and the flight history test must be executed when the CGCC is replaced. See therefore chapter 31-46-00, P. Block 501. Operational Test.

NOTE : Besides the facilities mentioned before, the CGCC has the provision for Automatic Test Equipment (ATE) used in bench maintenance of the computer itself. For this the internal circuit functions are connected to an ATE connector on the front of the CGCC. With the help of the Automatic Test Equipment an acceptance test of the CGCC may be executed. During these tests the computer inputs are provided with test data and the outputs are checked for proper output conditions.

B. Flight History Test
A maximum of 16 failures for each of the different flights may be stored

in the non-volatile memory of the CGCC. A new flight begins for the CGCC always one minute after engines shut-down on the ground.
The first failure condition which leads to an alternate mode type 1 and/or alternate mode type 2 and/or to a fault mode is kept in the nonvolatily memory, if the aircraft is in flight.

NOTE : If an engine fuel flow of 100 kg/h is exceeded between engines start-up and engines shut-down, even though for ground operations only, the count of flight legs for the flight history is incremented one minute after engines shut-down.

The flight history test is executed by pressing the display switch on the CGCC to the FLIGHT HISTORY position. The flights are selected as follows:
- one time for the CURRENT STATUS,
- once again before 4 seconds have elapsed for the LAST FLIGHT,
- once again before 4 seconds have elapsed for FLIGHT-1,
- once again before 4 seconds have elapsed for FLIGHT-2,
- once again before 4 seconds have elapsed for FLIGHT-3,
- once again before 4 seconds have elapsed for FLIGHT-4.

A return to the CURRENT STATUS is achieved by waiting more than 4 seconds before pressing the switch again.
The definition of a flight history test message is as follows:
flight number, failure number, failure message;
failure number, failure message;
.....etc.;
end.

The flight numbers are:
CURRENT STATUS,
LAST FLIGHT,
FLIGHT-1,
FLIGHT-2,
FLIGHT-3,
FLIGHT-4.

The failure numbers are:
01 for the 1st failure,
02 for the 2nd failure,
....etc.,
16 for the last failure

When no failure is detected, the following is displayed:
flight number, NO FAILURE END.

NOTE : - Selection of the last flight causes the CGCC to display the failures which occured before the last engine shut-down.
- Selection of any other flight causes the CGCC to display the failures which occured during these flights.
- A new flight begins always 60 s after a shut-down of both engines.

C. Availability Test
During this test the present system status is indicated by taking failure snapshots with the help of the CGCC monitor channel.
The test is executed by pressing the display switch on the CGCC to the TEST position. Every time when TEST is selected, a snapshot is taken and

a test message is displayed. The definition of an availability test message is as follows:
failure number, failure message;
failure number, failure message;
....etc.;
end.
The failure numbers are the same as for the flight history test:
01 for the 1st failure,
02 for the 2nd failure,
...etc.,
16 for the last failure.
When no failure is detected, the following is displayed:
NO FAILURE END.

D. BITE Philosophy

**ON A/C 101-200,

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(Ref. Fig. 022)

**ON A/C 101-200,

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The figure shows how the **BITE** works.

(1)Aircraft on the ground

If a new flight has been started the **BITE** can detect an alternate mode 1 or 2 or a fault mode. It does this as long as a cause for one of these modes is present. The different modes and their causes are indicated as follows:

- The actual failure conditions are shown during the availability test.
- Failures which occured on the flight before are shown under **LAST FLIGHT** of the flight history test. Shown is only the first alternate mode 1, alternate mode 2 or fault mode condition.

NOTE : Fault messages are shown under **FLIGHT -1** after the use of the engines even for ground operations only, if the fuel flow exceeded 100 kg/h during these operations.

- Alternate 2 and fault conditions, which occur after landing are only shown during the availability test as long as they are present. They are kept in the nonvolatile memory after take off, if the failure condition still persists. They are then shown under **LAST FLIGHT** of the flight history test.

(2)Aircraft in flight

FAILURE OCCURENCE		BITE MESSAGES VISIBLE ON		
		AVAILABILITY TEST	FLIGHT HISTORY TEST	
ON LAST FLIGHT	ON GROUND		LAST FLIGHT	CURRENT STATUS
ALT1 AND/OR ALT2 AND/OR FAULT	—	—	—	THE FIRST CAUSE WHICH LED TO AN ALTERNATE MODE 1 AND/OR ALTERNATE MODE 2 AND/OR A FAULT MODE IS RECORDED
—	ALT1 AND/OR ALT2 AND/OR FAULT	ALT1 AND/OR ALT2 AND/OR FAULT	—	—

BM6 31 46 00 0 BQU0 00

BITE Philosophy
Figure 022

In flight the first alternate mode 1, alternate mode 2 or fault mode condition which appears is kept in the nonvolatile memory. This is done if the condition is still present after take off or if this condition appears in flight.
If one of the conditions mentioned before disappears after landing but the **CGCC** remains in alternate - or fault mode the message **REFER LAST FLIGHT** is shown in the availability test.
The failures are then shown under **LAST FLIGHT** of the flight history test.
The failures are shown during an availability test, if they are still present on the ground after landing.

E. CGCC Messages

The failure messages for the flight history test and the availability test are equal.

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MESSAGE	MESSAGE LIST REFERENCE	MEANING
CGCC	6.F.(2)(a)	Center of Gravity Control Computer
FQIS	6.G.(1)(a)	Fuel Quantity Indication System
WBS1	6.J.(3)	Weight and Balance System 1
WBS2	6.J.(3)	Weight and Balance System 2
NO DATA WBS1	6.J(3)	
NO DATA WBS2	6.J.(3)	
NO DATA FMS/WBS	6.F.(1)(a)	No initial ZFW and ZFCG
FMS1	6.J.(1)	Flight Management System 1
NO DATA FMS1	6.J.(2)	
FMS2	6.J.(1)	Flight Management System 2
NO DATA FMS2	6.J.(2)	
NO DATA FMS1-2	6.J.(2)	
DADS1	6.J.(9)	Digital Air Data System 1
NO DATA DADS1	6.J.(10)	
DADS2	6.J.(9)	Digital Air Data System 2
NO DATA DADS2	6.J.(10)	
DADS1-2	6.G.(2)(j)	
IRS1	6.I.(1)/6.J.(4)	Inertial Reference System 1
NO DATA IRS1	6.J.(5)	
IRS2	6.I.(1)/6.J.(4)	Inertial Reference System 2
NO DATA IRS2	6.J.(5)	
NO DATA IRS1-2	6.J.(6)	
FFML	6.J.(7)	Fuel Flow Meter Left
NO DATA FFML	6.J.(8)	
FFMR	6.J.(7)	Fuel Flow Meter Right
NO DATA FFMR	6.J.(8)	
FFML-R	6.G.(2)(k)	
TRIM TK HIGH/CALB SENSORS	6.H.(1)	
TRIM TK LOW/CALIB SENSORS	6.H.(2)	Sensor signals
AFT CG WARN CONFIG	6.G.(2)(a)	Discrete from FWS
AFT CG WARN INOP	6.G.(2)(b)	
REFUEL/XFR VALVE	6.G.(2)(c)	|
FWD XFR CONTROL VALVE	6.G.(2)(d)	|
FWD AUX XFR VALVE	6.G.(2)(e)	> Status of valves
AFT XFR VALVE LEFT	6.G.(2)(f)	|
AFT XFR VALVE RIGHT	6.G.(2)(g)	|
TRIM TK PUMP 1-2	6.G.(2)(h)	Pumps switched off or Low Pressure Indication
TRIM TK PUMP CONTROL	6.F.(1)(c)	Switches on Cockpit Fuel Control Panel

MESSAGE	MESSAGE LIST REFERENCE	MEANING
FLIGHT/GROUND SWITCH	6.K.(1)	Landing gear relay or CGCC
AUTO/FWD SELECT	6.F.(1)(d)	Switch on Cockpit Fuel Control Panel
TARGET EXCEEDED	6.F.(1)(b)	A/C CG behind target CG
NO FAILURE		No failure detected
END		End of a message

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F. Fault Mode Messages
There are two different fault modes:
- CGCS fault
- CGCC fault
The CGCS fault is a failure detected within the CGCS or in the related systems and does also cover the CGCC itself.
The CGCC fault is a failure detected in the CGCC itself. In this case it is necessary to replace the computer when the aircraft is on the ground. In both failure cases the crew must empty the trim tank with the help of a manual forward transfer.

(1)CGCS System Fault
The LH ECAM display shows the message TRIM TK SYS FAULT. To see the message on the ground it is necessary to switch on at least one trim tank pump. On the overhead panel the FAULT caption of the TRIM TK MODE pushbutton comes on.
The fault mode is latched if it occurs in flight. On the ground and after engine shut-down the failures are shown under LAST FLIGHT of the flight history test.
The fault mode is not latched if it occurs on the ground. It disappears automatically if the cause disappears. Failures are only shown during an availability test as long as the failure is present.

(a)Message NO DATA FMS/WBS
The CGCC has not received the initial ZFW and ZFCG values either from the FMS or from the WBS.
The failure does not lead to a fault mode if it occurs on the ground. The message is then only shown during an availability test. It leads to a fault mode, if the CGCC gets no initial ZFW and ZFCG in flight. The failure is then kept in the nonvolatile memory.
The following maintenance actions are necessary if ZFW and ZFCG were inserted by the crew:
- Check of the FMS1 and the FMS2.
- Check of the WBS1 and the WBS2, if installed.

- Check of the aircraft wiring between the CGCC and the FMS or the WBS.
- Check of the CGCC.

(b)Message TARGET EXCEEDED

The CGCC keeps the message in its nonvolatile memory, if during flights the aircraft CG is more than 0.3 % MAC behind the target CG, which is valid for flights above FL205.

The following maintenance actions are necessary:

- Check of the fuel system.
- Check of the CGCC.

(c)Message TRIM TK PUMP CONTROL

If the TRIM TK PUMP pushbuttons fail or are switched OFF and an alternate mode follows, the CGCC goes from normal operation into the fault mode.

The fault mode is also entered if the TRIM TK PUMP P/B fail or are pressed during an alternate mode.

The following maintenance actions are necessary if the crew did not switch off the TRIM TK PUMP pushbuttons:

- Check of the TRIM TK PUMP pushbutton.
- Check of the aircraft wiring.
- Check of the CGCC.

(d)Message AUTO/FWD SELECT

If the TRIM TK MODE pushbuttons fails or is pressed and an alternate mode follows, the CGCC goes from normal operation into the fault mode.

The fault mode is also entered if the TRIM TK MODE P/B fails or is pressed during an alternate mode.

The following maintenance actions are necessary if the crew did not press the TRIM TK MODE pushbutton:

- Check of the TRIM TK MODE pushbutton.
- Check of the aircraft wiring.
- Check of the CGCC.

(2)CGCC Computer Fault

A computer fault is also indicated on the LH ECAM display and by the FAULT caption of the TRIM TK MODE pushbutton on the fuel control panel. Also, the fault is indicated by the FAULT light on the maintenance panel if the panel is switched on.

A computer fault does not stop the CG control. The pilots have to follow the same procedure which applies to CGCS faults.

A message is stored if the failure occurs in flight. It is shown during a flight history test.

The message is also shown during an availability test if the failure occurs on the ground and as long as the failure is present.

(a)Message CGCC

The subsequent possibilities lead also to this message:

- Interruption of the 26 V/400 Hz voltage derived by the stabilizer synchro transmitter.
- Interruption of one of the internal CGCC power supplies.
- No reception of the equipment identifier label 377 neither on the command nor on the monitor side of the CGCC.

The first two possibilities are not latched by the CGCC. If the failure disappears, the computer leaves the fault mode.

The message is stored if the failure occurs in flight.
The following maintenance actions are necessary:
- Check of the synchro transmitter voltage.
- Check of the CGCC.

G. Alternate Mode Messages

(1)Alternate Mode Type 1

The LH ECAM display shows the warning AFT XFR NOT AVAIL. On the FUEL page of the RH ECAM display the GW and CG are shown in amber or are crossed if the FQI computer is involved.
The messages are displayed during an availability test if the failure is still pending or during a flight history read-out, if the failure occured in flight.

(a)Message FQIS

The CGCC checks the sign status matrix (SSM) of the data word containing the tank contents. The word is transmitted by the FQI computer. The CGCC enters the alternate mode if the SSM of the FQIC contains no computed data (NCD), failure warning (FW) or functional test (FT) data for more than 60 seconds. The computer stores this event in its nonvolatile memory and sends the ALTERNATE MODE discrete the FWS. For this the CG and the GW on the RH ECAM display are crossed and shown in amber. The display shows the actual GW and CG again if the FQIC sends valid data again.
On the ground, the alternate mode is automatically reset if the FQI computer transmits Normal Operation (NO) on its Sign Status Matrix (SSM). This auto-reset is only possible, if there is no descrepancy between the FQI indication and the CGCC monitor.
The following maintenance action is necessary:
- Check of the FQI computer.

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(2)Alternate Mode Typ 2

The LH ECAM display shows the message AFT XFR NOT AVAIL. The CG and GW are shown on the RH ECAM display in amber. They are not crossed.
During this alternate mode of operation the fuel at transfer function is inhibited for the remaining flight leg and the TRIM TANK AFT XFER NOT AVAIL message is permanently displayed on the LH ECAM.
The CG and the GW are displayed on the RH ECAM in amber.
The warning on the LH ECAM display disappears when the aircraft is on the ground and the failure condition is eliminated.

(a)Message AFT CG WARN CONFIG

The CGCC receives a signal from the FWS that an AFT CG warning configuration problem exists and causes this message.
The following maintenance actions are necessary:
- Check of the FWS and the connected AFT CG warning system.

(b)Message AFT CG WARN INOP

The CGCC receives a signal from the FWS that an AFT CG warning

system failure exists and causes this message.
The following maintenance actions are necessary:
- Check of the FWS and the connected AFT CG warning system.

(c)Message REFUEL/XFR VALVE
The CGCC continuously compares the solenoid valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the solenoid valve 70QU and relay 72QU in the trim tank.
- Check of the CGCC discrete input and output for the solenoid valve.

(d)Message FWD XFR CONTROL VALVE
The CGCC continuously compares the valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the FWD transfer control valve 16QL in the main refuel gallery.
- Check of the CGCC discrete input and output for the valve.

(e)Message FWD AUX XFR VALVE
The CGCC continuously compares the valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the FWD auxiliary transfer valve 15QL in the main refuel gallery.
- Check of the CGCC discrete input and output for the valve.

(f)Message AFT XFR VALVE LEFT
The CGCC continuously compares the valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the aft transfer valve left 17QL in the main refuel gallery.
- Check of the CGCC discrete input and output for the valve.

(g)Message AFT XFR VALVE RIGHT
The CGCC continuously compares the valve status against the commands for the valve. If there is a discrepancy, the failure message is given.
The following maintenance actions are necessary:
- Check of the aft transfer valve right 18QL in the main refuel gallery.
- Check of the CGCC discrete input and output for the valve.

(h)Message TRIM TK PUMP 1-2
The message is given if both trim tank pumps are switched off or LO PR is indicated on both pump switches and if the CGCC wants to perform a FWD transfer from the trim tank to the center tank. In this case the computer goes into the alternate mode after 75 s.
The following maintenance actions is necessary:
- Check of both trim tank pumps, if the pumps are selected.

(j)Message DASD1 - 2
The CGCC goes into the alternate mode if in flight both DAGC send

on their ARINC label NCD, F/W or F/T for the MACH number or the BARO ALTITUDE for longer than 15 s. The computer stores a unique message in its nonvolatile memory.

The alternate mode disappears automatically on ground if both DADC transmit valid data again. A manual reset, to get the CGCC back into normal mode, is not possible.
The following maintenance action is necessary:
- Check of the DADS1 and the DADS2.

H. Failure Warnings of Peripheral Systems in Flight
The failures described in the following paragraph do not lead to an alternate or fault mode. But they may have an influence on the performance of the CGCS.
The failures are stored in the nonvolatile memory if they occur in flight. They are displayed on the ground under LAST FLIGHT of the flight history read-out.

NOTE : If the engine fuel flow exceeded 100 kg/h during an additional use of the engines for ground operations only before a flight history read-out is made, the failures are displayed under FLIGHT -1.

(1)Message IRS1 or IRS2
The message is stored if during flight one or both IRS transmit on the pitch angle data word the subsequent data:
- FW for longer than 10 s.
- FT for longer than 10 s.
- NCD for longer than 10 s.
If one or both IRS transmit invalid data or if the difference between both outputs is more than 0.5 degrees, the CGCC calculates with a fixed value of +5 degrees pitch up. This event is not indicated to the crew.
The following maintenance action is necessary:
- Check of the IRS shown in the message.

J. Failure Warnings of Peripheral Systems on Ground
The failures described in the following do not lead to an alternate mode or fault mode. But they can have an influence on the performance of the CGCS. The failures are not stored in the nonvolatile memory.
They are displayed during the execution of an availability test as long as they exist.
(1)Message FMS1 or FMS2
A failure warning in the ZFW data word and/or the ZFCG data word for more than 10 s leads to the message.
The following maintenance action is necessary:
- Check of the FMS shown in the message.
(2)Message NO DATA FROM FMS1 or NO DATA FROM FMS2 or no DATA FROM FMS1-2.
The message is shown if the subsequent occurs:
- ZFW and ZFCG either from FMS1 or FMS2 are not available.
- One FMS is in Functional Test.

- The received ZFW and ZFCG are out of range:
  - ZFW less than 75 000 kg
  - ZFW more than 200000 kg
  - ZFCG less than 10 % MAC
  - ZFCG more than 40 % MAC

The following maintenance actions are necessary:
- Check whether the inserted ZFW and ZFCG is out of range.
- Check of the FMS, which is mentioned in the message.
- Check of the CGCC.

(3)Messages WBS1, WBS2, NO DATA FROM WBS1 or NO DATA FROM WBS2 TBD.
The messages will be defined after certification of a WBS.

(4)Message IRS1 or IRS2
A failure warning on the pitch data word for more than 10 s leads to this message.
The following maintenance action is necessary:
- Check of the IRS mentioned in the message.

(5)Message NO DATA FROM IRS1 or NO DATA FROM IRS2.
The message is shown if one or both IRS transmit on their data word the following:
- F/T for more than 10 s,
- NCD for more than 10 s.

The following maintenance actions are necessary:
- Check of the IRS.
- Check of the wiring between the CGCC and the IRS.
- Check of the CGCC.

(6)Message NO DATA IRS1-2
The message is shown, if IRS transmit NCD or F/T on their data word. It is normally shown, if on the ground both IRS are switched off by the crew.
In that case the A/C CG transmitted by the CGCC is computed with 5° pitch up.

(7)Message FFML or FFMR
This message appears only when the aircraft is on ground. The message is displayed if one or more FFM transmit a F/W signal in their data word for a period longer than 10 s.
The following maintenance actions is necessary:
- Check of the FFM.

(8)Message NO DATA FROM FFML or NO DATA FROM FFMR
These messages appear only when the aircraft is on ground. The messages are displayed if one FFM transmits one of the following signals in its data word for a period longer than 10 s:
- F/T for more than 10 s.
- NCD for more than 10 s.

The following maintenance actions are necessary:
- Check of the FFM shown in the message.
- Check of the wiring between the FFM and the CGCC.
- Check of the CGCC.

(9)Message DADS1 or DADS2
The message is shown if one DADS transmits a F/W on its Mach number data word or its altitude data word for more than 10 s.
The following maintenance action is necessary:

- Check of the DADS shown in the message.

(10)Message NO DATA FROM DADS1 or NO DATA FROM DADS2
The message is shown if one DADS transmits a F/T or NCD for more than 10 s on its altitude data word.
The following maintenance action is necessary:
- Check of the DADS shown in the message.

K. CGCC Input Monitoring

(1)Message FLIGHT/GROUND SWITCH
The CGCC compares the status of the flight/ground switch against the SSM of the Mach number of both DADCs. A discrepancy lasting longer than 3 min leads to the message.
The message is kept in the nonvolatile memory of the CGCC and shown under LAST FLIGHT of the flight history test, if the failure occurs in flight.
On the ground the message is shown during an availability test as long as the failure is present.
The following maintenance actions are necessary:
- Check of the flight/ground switch.
- Check of the aircraft wiring.
- Check of the CGCC.

L. Cross Reference to Last Flight

(1)Message REFER LAST FLIGHT
This message is shown during an availability test if in flight a fault mode or an alternate mode occured. The message is only then shown if the failure disappears after landing, but the CGCC remains in the fault - or the alternate mode. However, the reason for this mode is indicated under LAST FLIGHT of the flight history test.

NOTE : The count of flight legs will also be incremented by one if the engine fuel flow exceeded 100 kg/h during the use of the engines for ground operations only. Therefore the message REFER TO LAST FLIGHT will not appear after such an operation. The reason for the fault, however, is shown under FLIGHT -1.

7. Interfaces

For the realization of its various control functions, the CGCC provides a number of digital input/output interfaces on ARINC transmission lines, analog inputs and discrete inputs/outputs. The digital I/O data has octal labels.

A. ARINC Channel Inputs (Ref. Fig.) (Sheet 1 of 4)
The CGCC provides ARINC 429 inputs for the systems mentioned below and three additional spare inputs.

1 Fuel Quantity Indication System
The CGCC is supplied by one FQI ARINC 429 bus and accepts the following data:
- label 256 Fuel Quantity - left outer tank,
- label 257 Fuel Quantity - left inner tank,

- label 260 Fuel Quantity - center tank,
- label 261 Fuel Quantity - right inner tank,
- label 262 Fuel Quantity - right outer tank,
- label 263 Fuel Quantity - trim tank,

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- label 264 Fuel Quantity - ACT
- label 265 Fuel Quantity - ACT2
- label 324 Pitch Attitude
- label 325 Roll Attitude

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Bits 12 and 13 of the data word with label 260 show the CGCC if the additional center tanks are installed:

Bit 12	Bit 13	ACT/ACT2
0	0	ACT not / ACT2 not
1	0	ACT yes / ACT2 not
0	1	ACT yes / ACT2 yes

2 Weight and Balance System
Each CGCC channel is supplied with one WBS ARINC 429 bus and accepts the following data:
- label 075 Gross Weight in lbs.,
- label 076 Longitudinal CG.

The data received on both channels are consolidated.

3 Flight Management System
Each computer channel is supplied with one FMS ARINC 429 bus and accepts the following data:
- label 066 Zero Fuel CG,
- label 074 Zero Fuel Weight.

4 Digital Air Data System
Each CGCC channel accepts the following data supplied by DADC1 or respectively by DADC2:
- label 203 Altitude (1013.25 mb),
- label 205 Mach Number.

5 Inertial Reference System
Each computer channel accepts the Pitch Angle (label 324) supplied by IRS1 respectively IRS2.

6 Fuel Flow Indicators
The CGCC is supplied by two Fuel Flow ARINC buses dedicated to the left respectively the right fuel flow indicator and accepts the Fuel Flow (label 347) on each input.

B. Analog Inputs (Ref. Fig.) (Sheet 1 of 4)
The CGCC has a synchro input for data supplied by the stabilizer position synchro having the following characteristics:
- 0° synchro = 0° flight surface,
- 1.6° synchro = 1° flight surface,
- synchro range = -180° to +180°,
- flight surface range = +3° to -14°.

C. Discrete Inputs (Ref. Fig.) (Sheets 1 of 4, 2 of 4 and 3 of 4)
The CGCC provides discrete inputs for the input sources mentioned below as well as a number of spare inputs. The level status is as follows:
- Ground signal is represented by a voltage between 0 and 3.5 V DC on a resistance of ≤10 Δ to DC Ground.
- 28 V DC is represented by a voltage between +18.5 and 36.0 V DC on a resistance of ≥100 kΔ to DC Ground.
- Open Voltage (O.V.) if the circuit is open.

1 Refuel Mode Select
Source : Refuel/defuel mode selector switch
28 V DC : Refuel selected
0 V DC : Refuel not selected.

2 Flight/Ground Signal
Source: Landing gear relay
O.V. : in Flight
Ground: On Ground.

3 CGCC Outputs Enabled
Source : trim tank pump control switches
O. V. or 28 V : Both pumps off
Ground : Either pump on.

4 AUTO/FWD Mode Select Switch
Source : Switch on fuel control panel
Ground : FWD mode
WLDV : AUTO mode, (WLDV = White Light Dimming Voltage).

5 CGCC System Fault Feedback
Source : FAULT Light on Fuel Control Panel
Ground : FAULT
ALDV : No FAULT, (ALDV = Amber Light Dimming Voltage).

6 Pump Low Pressure Signals
Source : 2 Center Tank Pumps
4 Inner Tank Pumps
2 trim tank Pumps
Ground : Signalled OFF or signalled ON and failed
ALDV : Signalled ON and running
The pumps require up to 0.5 s to operate the pressure switches.

7 Valve Open Signals
Source : 2 AFT transfer valves (valves E and F)

1 FWD transfer control valve (valve C)
1 FWD auxiliary transfer valve (valve D)
28 V DC: Valve open
O.V. : Valve not open

8 Valve Close Signals
Source : 2 AFT transfer valves (valves E and F)
1 FWD transfer control valve (valve C)
1 FWD auxiliary transfer valve (valve D)
28 V DC : Valve closed
O.V. : Valve not closed

9 Refuel/Transfer Valve Status
Source : Solenoid refuel transfer valve (valve B)
28 V DC : commanded open (3 s delay)
Ground : commanded closed

10 Level Sensor Switching Signals
Source : 1 trim tank calibration sensor
1 trim tank low level sensor
1 trim tank flight level sensor
1 center tank high level sensor
2 Inner Tank Calibration Sensors,
additional center tank low level sensor
(if ACT is installed)
O.V. or 28 V DC : Sensor wet
Ground : Sensor dry

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11 Programmable Inputs
Source : 3 hardwired input pins allowing adjustment of airline dependant safety margins as follows:

Program Pin 1	2	3	Airline dependant safety margins
OPEN	OPEN	GDN	1.5 % MAC at 150 t
OPEN	GND	OPEN	1.0 % MAC at 150 t
GND	OPEN	OPEN	0.5 % MAC at 150 t
GND	GND	GND	0.0 % MAC at 150 t

12 AFT CG WARNING SYSTEM FAILURE
Source : Flight warning computer
Ground : No THS system failure
Open circuit : THS system failure

13 AFT CG WARNING CONFIGURATION PROBLEM
Source : Flight warning computer
Ground : No THS system configuration problem
Open circuit : THS configuration problem

14 AFT CG WARNING CG CAUTION
Source : Flight warning computer
Ground : Caution not valid
Open Circuit : Caution valid

D. ARINC Channel Outputs (Ref. Fig.) (Sheet 4 of 4)
The CGCC provides one ARINC 429 output bus which is connected to the SGUs of the ECAM system and the DFDAU of the Aircraft Digital Information System.
The CGCC transmits the following 32 bit words on its output bus:
- Longitudinal CG Data Word
  Label = 076
  Units = % MAC
  Range = 163.84
  Significant bits = 14 (without sign bit)
  Resolution = 0.01
- Gross Weight Data Word
  Label = 075
  Units = lbs
  Range = 1, 310, 720
  Significant bits = 15 (without sign bit)
  Resolution = 40

Both words are transmitted in BNR code with a minimum transmit interval of 100 msec respectively a maximum transmit interval of 200 msec. Both words contain the following status information in bits 30 and 31.

Bit 31/30	Definition
0 0	Failure warning in case of - detected CGCC or FQI faults - FQI/CGCC monitor disagreement due to undetected faults
0 1	No computed data after engine shut down (on ground FF <200 kg/h) until insertion of new valid ZFW and ZFCG values.
1 0	Functional test, during self-test and flight history read out.
1 1	Normal operation, as long as ZFW and ZFCG are valid and either FQI and monitor data agree.

- Equipment Code Word
  Label = 377
  Equipment Identifier 3E (hexadecimal)

- Discrete Word with label 270 containing the following information:

Bit	Function	Bit 1	Status 0
1	Label	X	
2	Label		X
3	Label	X	
4	Label	X	
5	Label	X	
6	Label		X
7	Label		X
8	Label		X
9	SDI		X
10	SDI		X
11	CG control mode	Alt.	Norm
12	AUTO/FWD Mode Selector Switch	Man.	Auto
13	CGCC outputs enabled	No	Yes
14	CG check required	Yes	No
15	Aft transfer from center tank activated	Yes	No
16	Aft transfer from inner tank activated	Yes	No
17	Normal forward transfer activated	Yes	No
18	Fast forward transfer activated	Yes	No
19	Spare		
20	Spare		
21	Spare		
22	Spare		
23	Spare		
24	Spare		
25	Spare		
26	Spare		
27	Spare		
28	ACT installed	Yes	No
29	ACT installed	Yes	No
30	SSM		
31	SSM		
32	Parity (odd)		

- Maintenance word with label 350 containing the following information:

Bit	Function	Bit 1	Status 0
1	Label	X	
2	Label	X	
3	Label	X	
4	Label		X
5	Label	X	
6	Label		X
7	Label		X
8	Label		X
9	SDI		X
10	SDI		X
11	CG control system fault	Yes	No
12	AFT CG warning system failure	Yes	No
13	AFT CG warning config. problem	Yes	No
14	FQI1 data	invalid	valid
15	FF1 data	invalid	valid
16	FF2 data	invalid	valid
17	FMC1 data	invalid	valid
18	FMC2 data	invalid	valid
19	WBC1 data	invalid	valid
20	WBC2 data	invalid	valid
21	ADC1 data	invalid	valid
22	ADC2 data	invalid	valid
23	IRS1 data	invalid	valid
24	IRS2 data	invalid	valid
25	Spare		
26	Flight/ground switch signal	invalid	valid
27	FQI2 data	invalid	valid
28	1.5% MAC more FWD	X	
29	Additional 2.3% MAC more FWD	X	
30	SSM		
31	SSM		
32	Parity (odd)		

- Maintenance word with label 351 containing the following information:

Bit	Function	Bit 1	Status 0
1	Label	X	
2	Label	X	
3	Label	X	
4	Label		X
5	Label	X	
6	Label		X
7	Label		X
8	Label	X	
9	SDI		X
10	SDI		X
11	TT pump left	failed	OK
12	TT pump right	failed	OK
13	Refuel/transfer valve	failed	OK
14	FWD transfer control valve	failed	OK
15	FWD auxiliary transfer valve	failed	OK
16	AFT transfer valve, left	failed	OK
17	AFT transfer valve, right	failed	OK
18	Spare		
19	Spare		
20	Spare		
21	Spare		
22	Spare		
23	Spare		
24	Spare		
25	Spare		
26	Spare		
27	Spare		
28	Spare		
29	Spare		
30	SSM		
31	SSM		
32	Parity (odd)		

E. Discrete Outputs (Ref. Fig.) (sheet 4 of 4)

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(Ref. Fig. 023) (Sheet 1 of 4)
(Ref. Fig. 023) (Sheet 2 of 4)
(Ref. Fig. 023) (Sheet 3 of 4)
(Ref. Fig. 023) (Sheet 4 of 4)

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The CGCC provides the following output signals for control and indication:

1 Left Aft Transfer Valve
28 V DC: Open valve E (load = 0.11 A inductive)
<1 V DC : Close valve E

2 Right Aft Transfer Valve
28 V DC : Open valve F (load = 0.11 A inductive)
<1 V DC : Close valve F

3 FWD Auxiliary Transfer Valve
28 V DC : Open Valve D (load = 0.11 A inductive)
<1 V DC : Close Valve D

4 Refuel/Transfer Valve
28 V DC : Open Valve B (load = 3.0 mA)
<1 V DC : Close Valve B

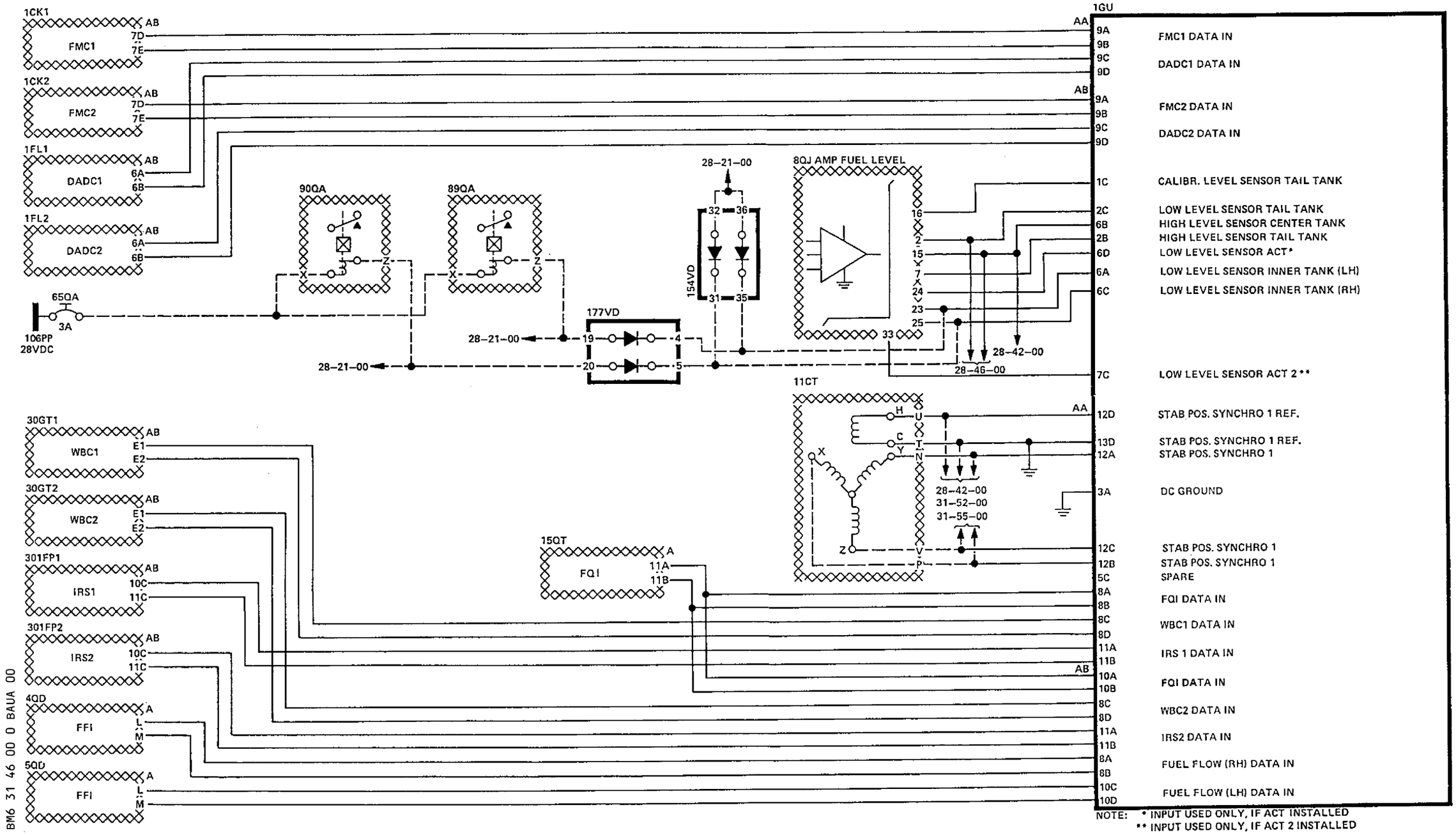
5 Normal FWD Transfer Control Valve
28 V DC : Close valve C, de-energize TT Pumps (load = 0.59 A inductive)
<1 V DC : Open valve C, energize TT Pumps

6 CG Control System Fault I
Destination : Flight Warning Computer (FWC)
28 V DC : No system failure
0.V. : System failure

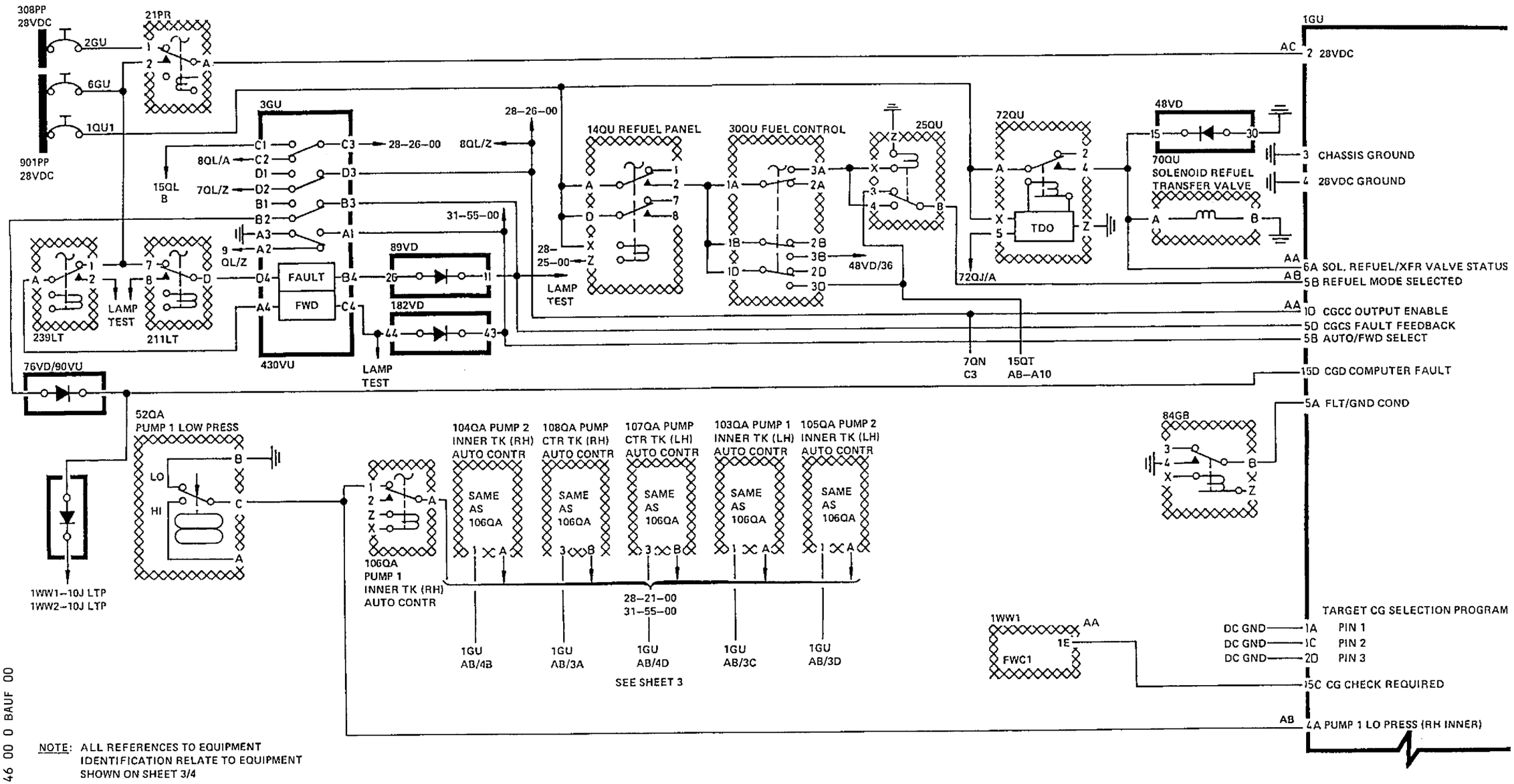
7 CG Control System Fault II
Destination : FAULT light on fuel control panel
0.V. : No system failure
Ground : System failure

8 CG Control Computer Fault
Destination : FAULT light on maintenance panel
0.V. : No computer failure
Ground : Computer failure

9 Alternate Mode



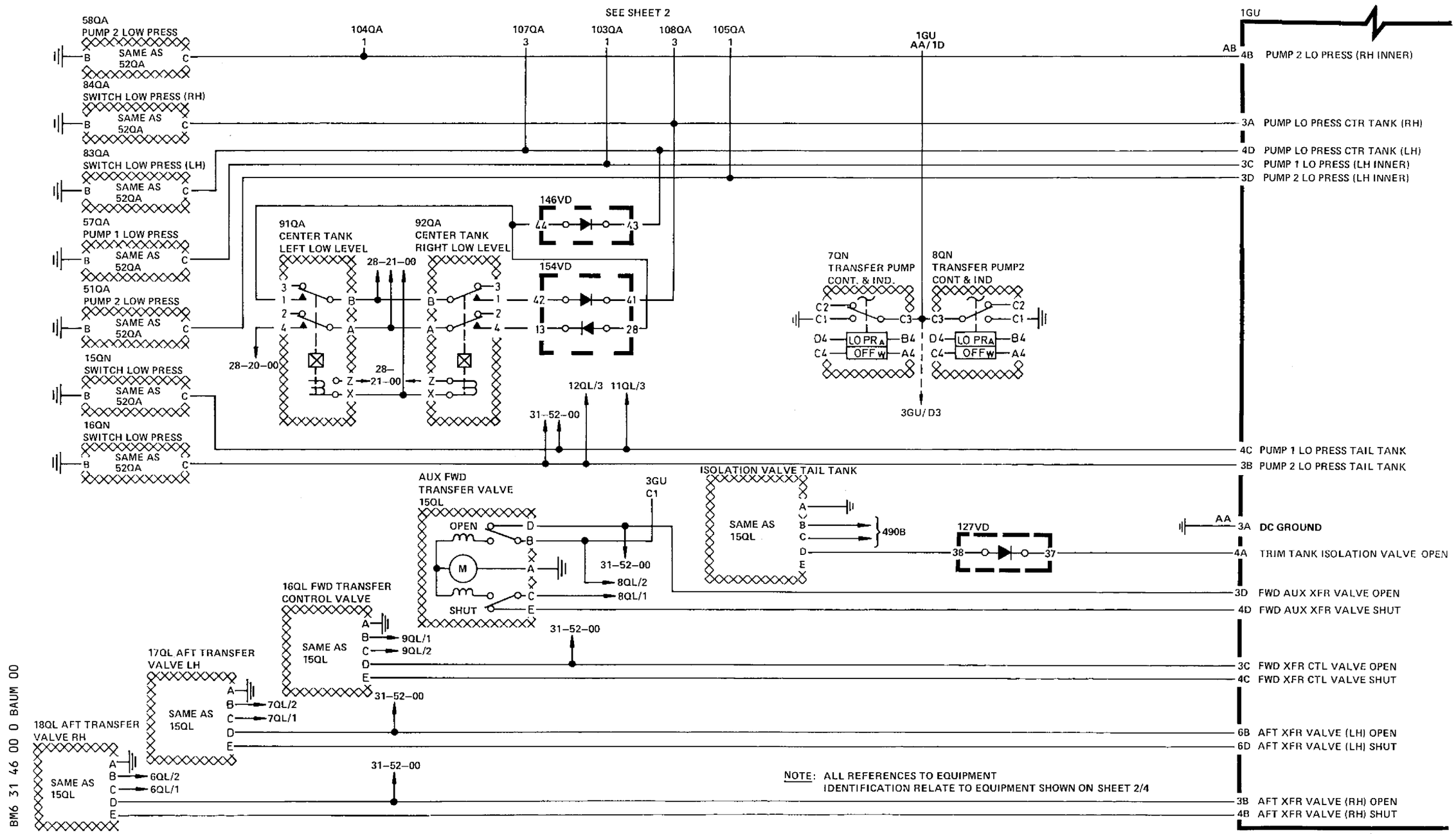
CGCS Schematic Diagram (Sheet 1 of 4)
Figure 023



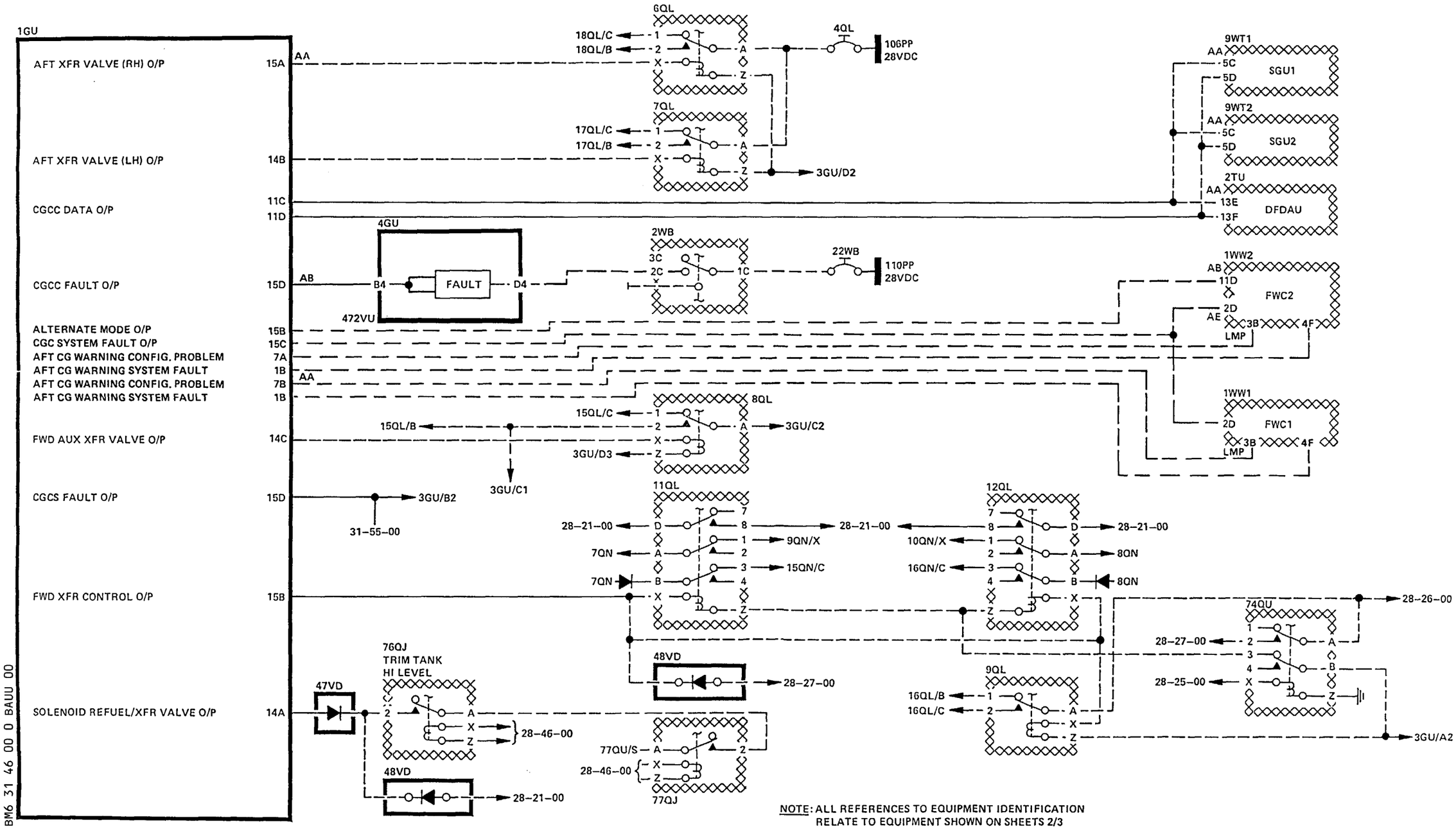
NOTE: ALL REFERENCES TO EQUIPMENT IDENTIFICATION RELATE TO EQUIPMENT SHOWN ON SHEET 3/4

BM6 31 46 00 0 BAUF 00

CGCS Schematic Diagram (Sheet 2 of 4)
Figure 023



CGCS Schematic Diagram (Sheet 3 of 4)
Figure 023



NOTE: ALL REFERENCES TO EQUIPMENT IDENTIFICATION RELATE TO EQUIPMENT SHOWN ON SHEETS 2/3

CGCS Schematic Diagram (Sheet 4 of 4)
Figure 023

Destination : FWC
O.V. : Normal mode
Ground : Alternate mode

10 CG Check Required
Destination : FWC
O.V. : No check required
Ground : CG check required

11 CG More Forward
Destination : FWC
O.V. : No target CG reduction
Ground : CG more forward

Besides the signals mentioned above, figure 023 also shows the busbars for CGCS supply as well as various busbars for several related systems.

1. Bite Test

A. Reason for the Job
- Indication of the present system status and readout of the flight history memory.
- System check when the CGCC is replaced.

B. Referenced Procedures

- 21-20-00, P. Block 301	Air Conditioning - Distribution/Extraction
- 24-41-00, P. Block 301	AC External Power Control
- 31-46-00, P. Block 1	Center of Gravity Control System

C. Procedure

WARNING : BEFORE POWER IS APPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Job Set-Up

(a)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(b)Make certain that electronics racks ventilation is correct (Ref. 21-20-00, P. Block 301).

(c)Make certain that the following circuit breakers are closed:

PANEL	SERVICE	IDENT.	LOCATION
22VU	FUEL-TRIM TANK-FWD XFR CGCC	2GU	201/J24
132VU	FUEL TRIM TANK CGCC	6GU	325/K51

(d)Open access door 211PZ to gain access to the electronics rack 90VU through the flight compartment.

NOTE : Access is also possible through the sidewall door 131AZ of FWD cargo compartment.

(2)Test

(Ref. Fig. 501)

ACTION	RESULT
1. On computer 1GU in 94VU: - Place momentarily display switch to the TEST position and release it to the neutral position.	On BITE Display of computer 1GU in 94VU the following test sequence is running: - NO FAILURE END or a message consisting of failure number with failure message, failure number with failure message, ...etc. followed by the message END is displayed for the indication of the present system status - BITE Display goes off
- Place display switch once to the	On BITE Display the following is

ACTION	RESULT
FLIGHT HISTORY position and release it to the neutral position.	displayed: - CURRENT STATUS NO FAILURE END or a message consisting of CURRENT STATUS, failure number with failure message, failure number with failure message, ...etc. and END for the indication of the system status since the last engines shut down plus 60 seconds. - BITE Display goes off.

NOTE : For indication of the system status during the flights before the last engines shut down, the display switch must be placed to the FLIGHT HISTORY position as follows:
- twice for the LAST FLIGHT
- three times for FLIGHT -1
- four times for FLIGHT -2
- five times for FLIGHT -3
- six times for FLIGHT -4.

The possible failure messages are listed in the description/ operation (Ref. 31-46-00, P. Block 1).

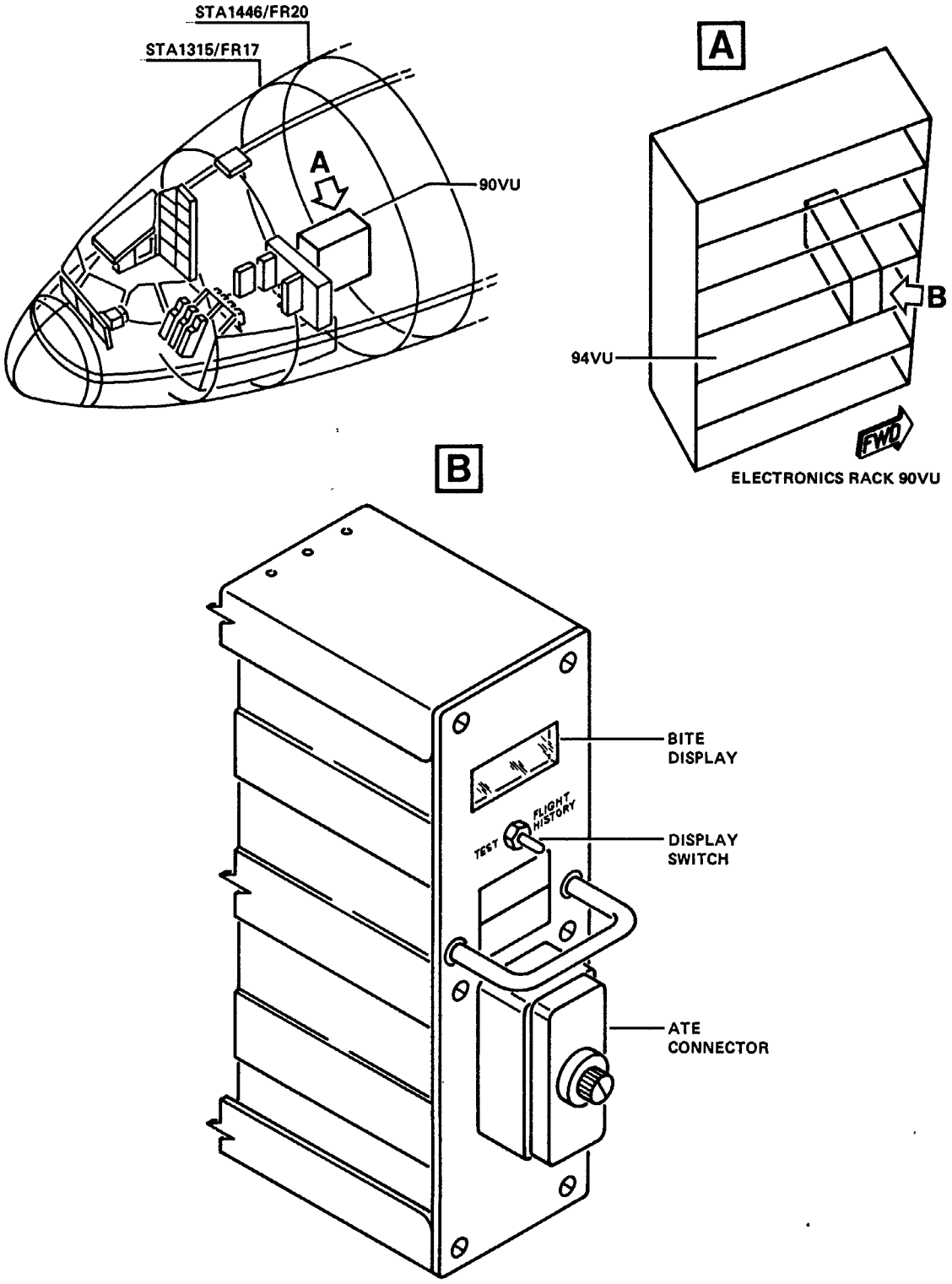
NOTE : If a fuel flow of 100 kg/h was exceeded, even if the engines were used for ground operations only, the count of flight legs is incremented by one. This advances the flight status messages up one in the position of the memory. The display switch must be placed according to this new position.

(3)Close-Up

(a)Close access door 211PZ in flight compartment.

R

R (b)De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).



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Center of Gravity Control Computer
Figure 501

2. Operational Test

NOTE : Before starting the Operational Test, the Bite Test should be executed.

A. Reason for the Job

Test of the Center of Gravity Control Computer (CGCC) via the Electronic Centralized Aircraft Monitor (ECAM) system.

B. Reference Procedures

- 21-20-00, P. Block 301	Air Conditioning - Distribution/Extraction
- 24-41-00, P. Block 301	AC External Power Control
- 28-00-00, P. Block 1	Fuel - General
- 28-42-00, P. Block 501	Quantity Indicating
- 31-46-00, P. Block 1	Center of Gravity Control System
- 31-51-00, P. Block 1	ECAM System - General
- 34-25-00, P. Block 501	Inertial Reference System (IRS)
- 34-61-00, P. Block 1	FMS Power Supply
- 34-63-00, P. Block 1	FMS Operational Use

C. Procedure

WARNING : BEFORE POWER IS APPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Job Set-Up

(a)Connect electrical ground power unit and energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(b)Make certain that electronics racks ventilation is correct (Ref. 21-20-00, P. Block 301).

(c)Switch on the ECAM system (Ref. 31-51-00, P. Block 1).

(d)Switch on the FUEL system (Ref. 28-00-00, P. Block 1).

(e)Switch on the CGCS (Ref. 31-46-00, P. Block 1).

(f)Switch on the FQI system (Ref. 28-42-00, P. Block 501).

(g)Switch on the FMS (Ref. 34-61-00, P. Block 1).

(h)Switch on the IRS (Ref. 34-25-00, P. Block 501) and align it.

(2)Test

R **ON A/C 001-100,

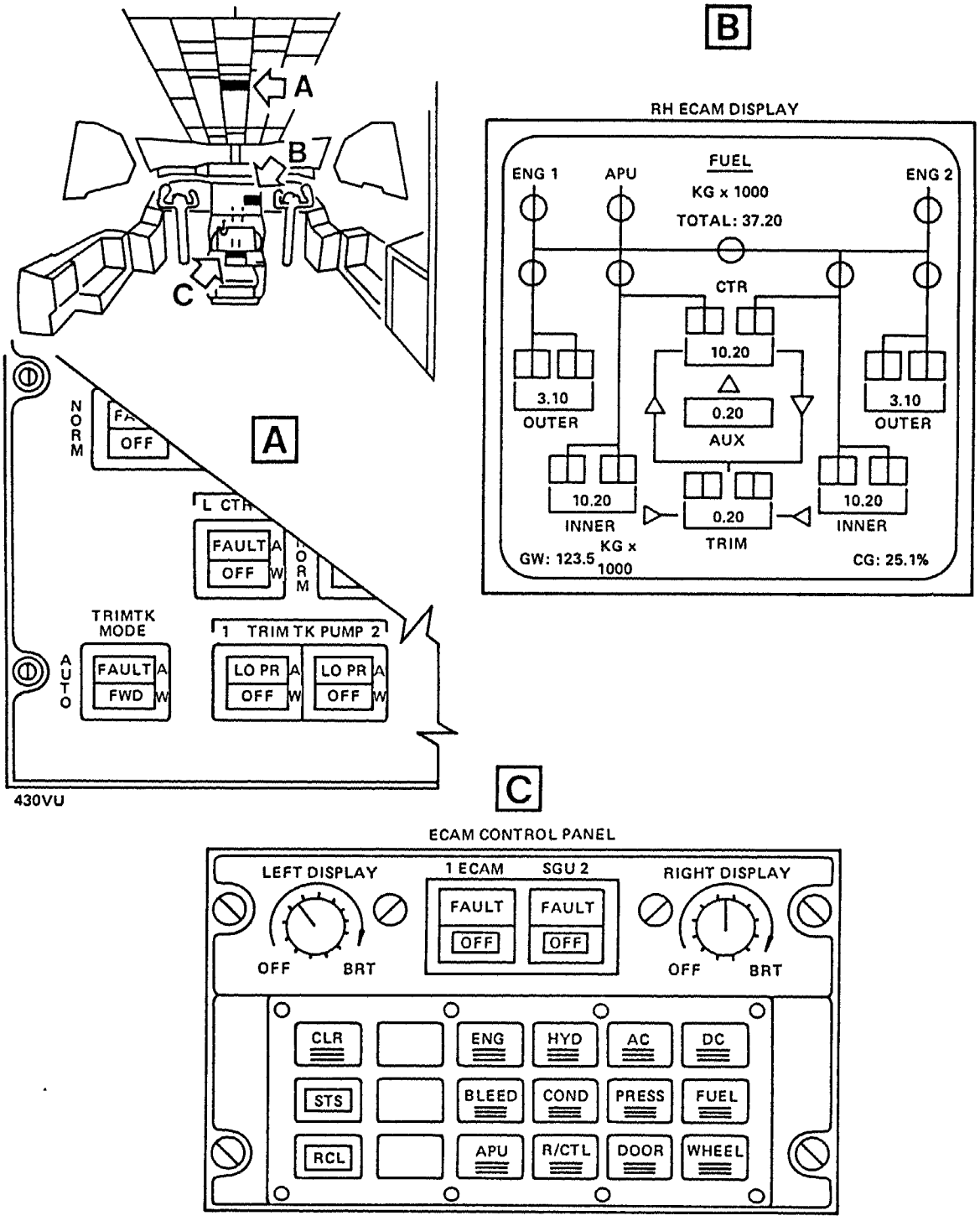
(Ref. Fig. 502)

R **ON A/C 101-200,

R (Ref. Fig. 503)

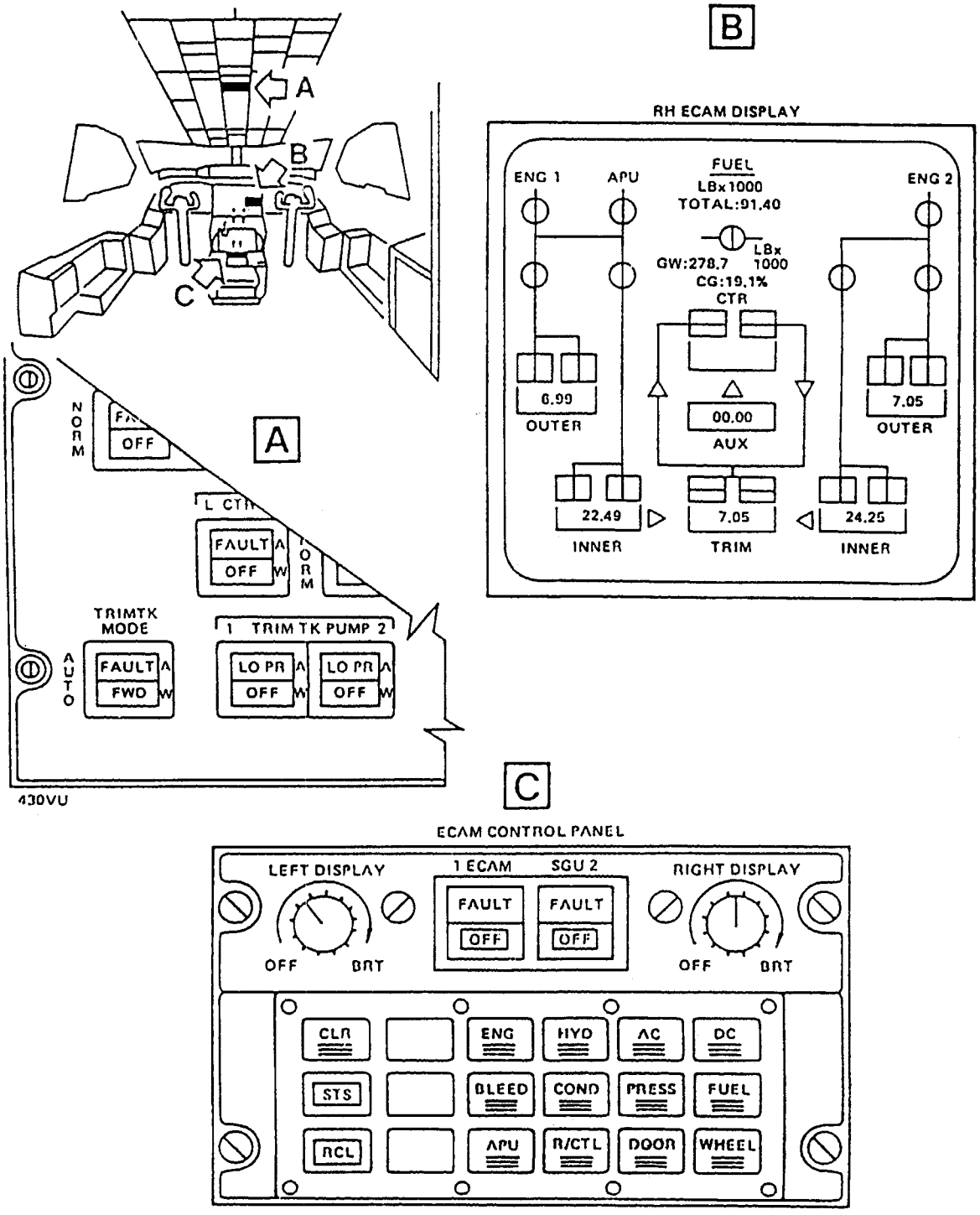
R **ON A/C ALL

NOTE : - The ECAM shows warning and status messages on the LH ECAM Display. It shows system pages in the form of synoptic Diagrams on the RH ECAM Display.
- The messages and system pages are related to incorrect systems and/or crew procedures. They are shown automaticly.
- For failures the ECAM also gives indications by the cockpit



BM3 31 46 00 5 ADM0 23

CGCS Test and Display
Figure 502



BM6 31 46 00 5 ADP0 00

CGCS Test and Display
Figure 503

loudspeakers and the MASTER WARN or MASTER CAUTION light.
- The crew controls the ECAM Displays on the ECAM Control Panel. The panel permits a selection of the different system pages (Synoptic Diagrams) by a number of pushbuttons.
- A CLR pushbutton comes on as long as a warning or status message is shown on the LH ECAM Display. It is also used to change the pages on the LH Display and to clear (after a correction by the crew) the warning messages.
- A RCL pushbutton is used to show a warning message again.
- A STS pushbutton is used to show the A/C status. This is not possible in flight phase 1 and flight phase 12.
- For the CGCC the following messages are possible:

  - FUEL
    ZFW OR ZFCG DISAGREE (And aural warning and MASTER CAUTION
    PROC: TRIM TK SYS INIT light. Message only possible when the A/C is on the ground.)

    STATUS

    PROC: TRIM TK SYS INIT

  - FUEL
    TRIM TK AFT XFR NOT AVAIL (Only when the CGCC is in alternate mode.)

    STATUS

    AUTO FWD XFR ONLY

  - FUEL
    TRIM TK SYS FAULT (And aural warning, MASTER CAUTION light and FAULT indication on TRIM TK MODE pushbutton.)

    STATUS

    AUTO TRIM TK SYS INOP

R **ON A/C 001-100,

- The Gross Weight (GW) and the Center of Gravity (CG) are shown on the FUEL page of the RH ECAM DISPLAY.
- GW and CG are also shown on the MEMO page of the LH ECAM Display. The MEMO page is shown when all systems, related to the ECAM, are in normal conditions.
- To get the CG and the GW displayed the following must be certain:
- If there is fuel in the trim tank, the outer wing tanks must contain a minimum of 2.5 t each. Preferably they should

be full.
- ZFCG and ZFW must be inserted on one CDU of the FMS, to allow CG and GW computations.
- It must be certain that the FQI computer is correct.
- No fuel discrepancy should occur between FQI and CGCC measurements, to avoid immediate alternate mode reaction of the CGCC.

R **ON A/C 101-200,

- The Gross Weight (GW) and the Center of Gravity (CG) are shown on the FUEL page of the RH ECAM DISPLAY.
- GW and CG are also shown on the MEMO page of the LH ECAM Display. The MEMO page is shown when all systems, related to the ECAM, are in normal conditions.
- To get the CG and the GW displayed the following must be certain:
- If there is fuel in the trim tank, the outer wing tanks must
R contain a minimum of 5500 lb each. Preferably they should be full.
- ZFCG and ZFW must be inserted on one CDU of the FMS, to allow CG and GW computations.
- It must be certain that the FQI computer is correct.
- No fuel discrepancy should occur between FQI and CGCC measurements, to avoid immediate alternate mode reaction of the CGCC.

R **ON A/C 001-100,

ACTION	RESULT
1. On ECAM Control Panel in 11VU: - Press the FUEL pushbutton.	On RH ECAM Display in 4VU: - FUEL page is displayed. On LH ECAM display in 4VU: - MEMO page or a warning page is displayed depending on the momentary ECAM status.
2. On FMS-CDU in 8VU: - Insert a ZFW of 95 t and a ZFCG of 25%. (Ref. 34-63-00, P. Block 1).	On RH ECAM display in 4VU: - The actual CG and the actual GW are displayed in green colour (CG is dependent on the inserted ZFCG and on the fuel distribution in the tanks)
3. On circuit breaker panel 132VU: - Open the following circuit breakers: FUEL FQI AND IND (1QT), 321/P59	After a delay time of approximately 1 min on RH ECAM display in 4VU:

ACTION	RESULT
FUEL FQI CHAN SUPPLY 1 (3QT), 321/P60 FUEL FQI CHAN SUPPLY 2 (4QT), 321/P61	- CG and GW indication is cleared and crossed in amber on the fuel page On LH ECAM display in 4VU: - The warning TRIM TK AFT XFR NOT AVAIL is displayed in amber
- Close circuit breakers 1QT, 3QT and 4QT.	On both ECAM displays in 4VU: After a delay time of approximately 1 min all failure indications are cleared.

(3)Close-Up
(a)Switch off the ECAM system (Ref. 31-51-00, P. Block 1).
(b)Switch off the Fuel system (Ref. 28-00-00, P. Block 1).
(c)Switch off the CGCS (Ref. 31-46-00, P. Block 1).
(d)Switch off the FQI system (Ref. 28-42-00, P. Block 501).
(e)Switch off the FMS (Ref. 34-61-00, P. Block 1).
(f)Switch off the IRS (Ref. 34-25-00, P. Block 501).
(g)De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).
(h)Make certain that work area is clean and clear of tools and miscellaneous items of equipment.

R **ON A/C 101-200,

ACTION	RESULT
1. On ECAM Control Panel in 11VU: - Press the FUEL pushbutton.	On RH ECAM Display in 4VU: - FUEL page is displayed. On LH ECAM display in 4VU: - MEMO page or a warning page is displayed depending on the momentary ECAM status.
2. On FMS-CDU in 8VU: R - Insert a ZFW of 209400 lb and a ZFCG of 25%. (Ref. 34-63-00, P. Block 1).	On RH ECAM display in 4VU: - The actual CG and the actual GW are displayed in green colour (CG is dependent on the inserted ZFCG and on the fuel distribution in the tanks)
3. On circuit breaker panel 132VU: - Open the following circuit breakers: FUEL FQI AND IND (1QT), 321/P59 FUEL FQI CHAN SUPPLY 1 (3QT), 321/P60	After a delay time of approximately 1 min on RH ECAM display in 4VU: - CG and GW indication is cleared

ACTION	RESULT
FUEL FQI CHAN SUPPLY 2 (4QT), 321/P61	and crossed in amber on the fuel page On LH ECAM display in 4VU: - The warning TRIM TK AFT XFR NOT AVAIL is displayed in amber
- Close circuit breakers 1QT, 3QT and 4QT.	On both ECAM displays in 4VU: After a delay time of approximately 1 min all failure indications are cleared.

(3)Close-Up
(a)Switch off the ECAM system (Ref. 31-51-00, P. Block 1).
(b)Switch off the Fuel system (Ref. 28-00-00, P. Block 1).
(c)Switch off the CGCS (Ref. 31-46-00, P. Block 1).
(d)Switch off the FQI system (Ref. 28-42-00, P. Block 501).
(e)Switch off the FMS (Ref. 34-61-00, P. Block 1).
(f)Switch off the IRS (Ref. 34-25-00, P. Block 501).
(g)De-energize the aircraft electrical network and disconnect electrical ground power unit (Ref. 24-41-00, P. Block 301).
(h)Make certain that work area is clean and clear of tools and miscellaneous items of equipment.

CENTER OF GRAVITY CONTROL CUMPUTER 1GU - REMOVAL/INSTALLATION

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Access Platform, 2 m (6.0 ft.)
Referenced Procedure - 31-46-00, P. Block 501	Center of Gravity Control System (CGCS)

2. Procedure
(Ref. Fig. 401)

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers:

PANEL	SERVICE	IDENT.	LOCATION
22VU	FUEL-TRIM TANK-FWD XFR CGCC	2GU	201/J24
132VU	FUEL-TRIM TANK CGCC	6GU	325/K51

(2)Position access platform.
(3)Open access door 121BL to gain access to the electronics rack 90VU.
NOTE : Access is also possible through access door 211PZ in the flight compartment or through the sidewall door 131AZ of the FWD cargo compartment.

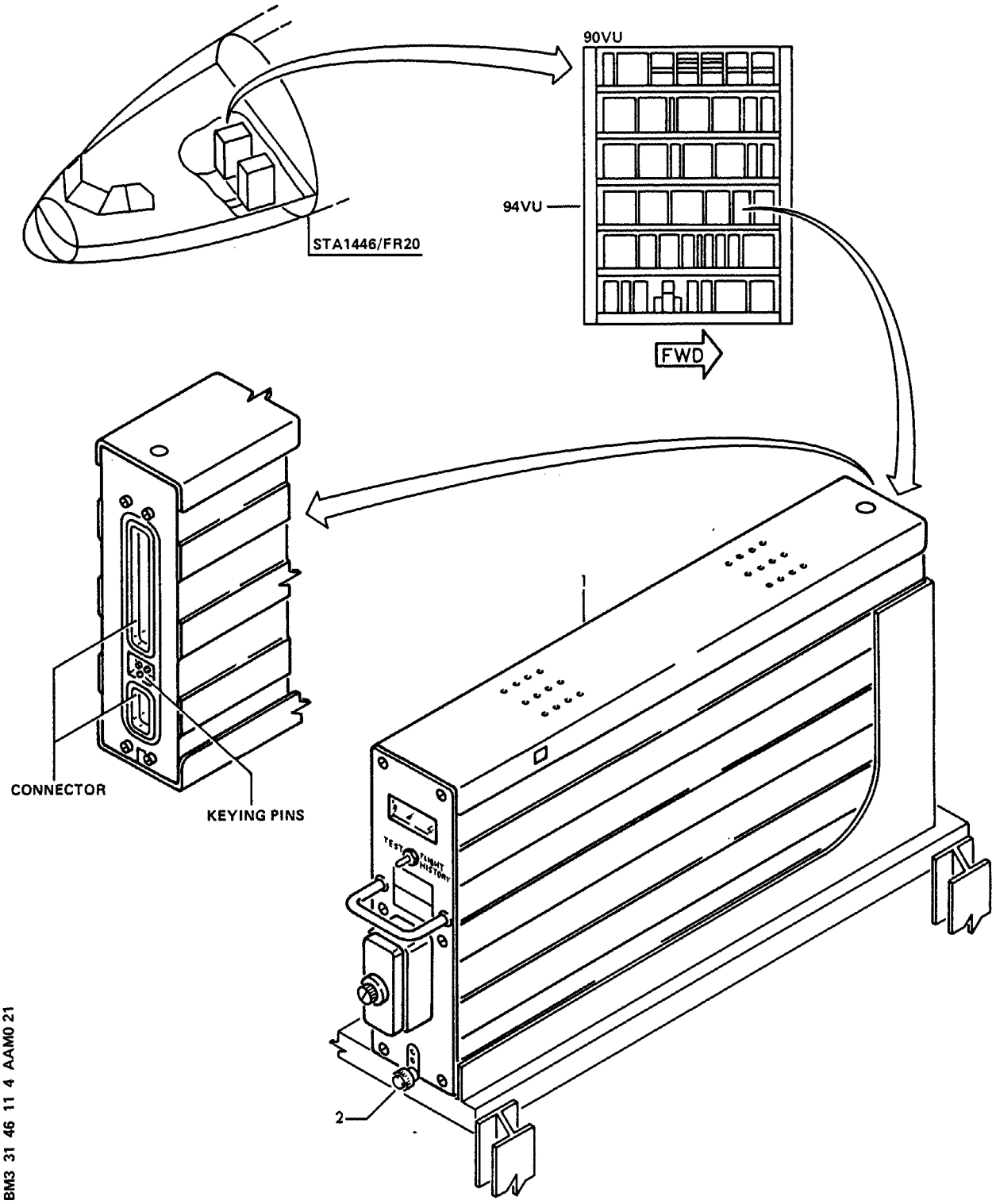
B. Removal
(1)On rack 94VU, unscrew knurled retaining screw (2).

(2)Withdraw computer (1) from rack.
(3)Cap connectors.

**ON A/C ALL

R

C. Installation
(1)Remove connectors protective caps and check connectors for correct condition.
(2)Slide Center of Gravity Control Computer (CGCC) (1) into the rack and engage connectors at the rear of the rack.
(3)Tighten knurled retaining screw (2).
(4)Remove safety clips and tags and close circuit breakers 2GU and 6GU.
(5)Press momentarily the display switch on CGCC 1GU to the TEST- position to allow a system reset.



CGCC - Installation
Figure 401

D. Test
(1)Do the Bite Test of the CGCS (Ref. 31-46-00, P. Block 501).
(2)Do the Operational Test of the CGCS (Ref. 31-46-00, P. Block 501).

NOTE : Disregard the CURRENT STATUS message of the flight history readout.

E. Close-Up
(1)Make certain that work area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door.
(3)Remove access platform.

R

1. Definition and Objectives

The ECAM (Electronic Centralized Aircraft Monitoring) system provides the crew with operational assistance for both normal and abnormal aircraft system configurations.
This operational assistance is given through two CRT (Cathode Ray Tube) display units by means of messages and system synoptic diagrams.
The data processing is fully automatic and as such does not require any additional crew action or selection.

A. Normal Configuration (Without Aircraft Systems Failure)

The ECAM system improves crew comfort by eliminating the need for frequent scanning of various systems panels for :

- monitoring temporarily used systems or functions
  (MEMO page normally displayed on the L ECAM display unit)
- routine system monitoring
  (System synoptic diagrams adapted to the present flight phase and displayed on the R ECAM display unit)
- systems parameters trending
  (Constant monitoring of some systems parameters which are automatically displayed on the R ECAM display unit when their value drifts out of normal range but well before reaching the warning level).

B. Abnormal or Emergency Configuration

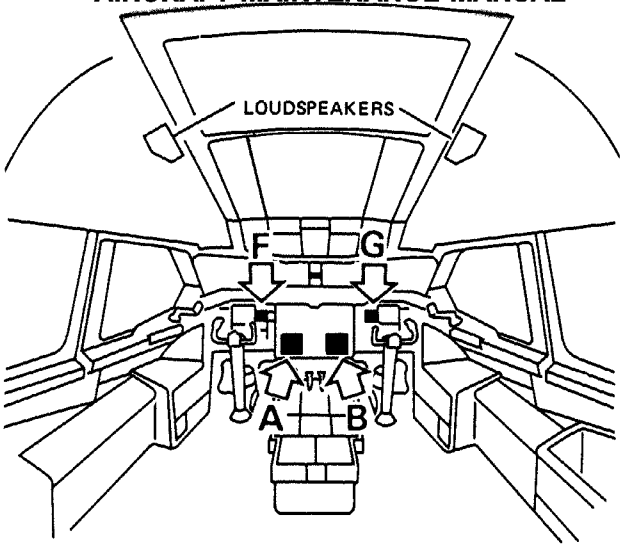
The ECAM system decreases significantly the crew mental workload by providing :

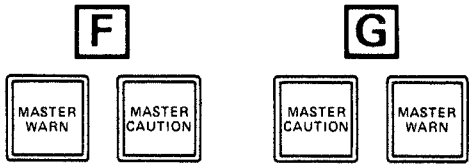
- Improved failure analysis
- Guidance of corrective actions
- Minimization of need to refer to paper check list or normal read out
- Improved understanding of aircraft and system configuration after failure.

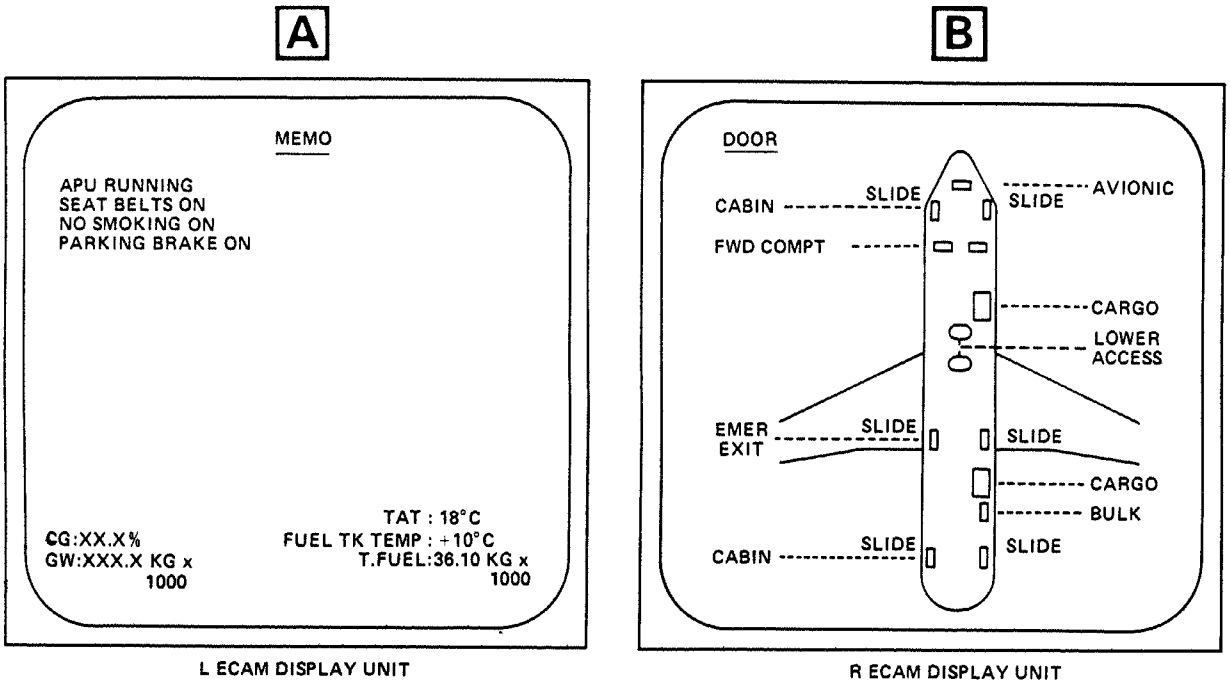
In addition the ECAM system generates aural and visual warnings in compliance with SAE - ARP 450-D and ARINC 726.
The aural warnings are transmitted by the flight compartment loudspeakers and the visual signals supply the ECAM display units and the MASTER lights.
The system does not process warnings with a probability less than 10-9 (extremely remote failure).

2. Component Location
(Ref. Fig. 001)
(Ref. Fig. 002)
(Ref. Fig. 003)
(Ref. Fig. 004)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
1WT	DISPLAY UNIT-ECAM, L	4VU	210		31-57-22
1WV	SDAC	94VU	122		31-55-22
1WW1	FWC-1	92VU	122		31-53-34
1WW2	FWC-2	93VU	122		31-53-34
3WT	DISPLAY UNIT-ECAM, R	4VU	210		31-57-23
5WT	CTL PNL-ECAM	11VU	210		31-57-11
9WT1	SGU-ECAM, 1	92VU	122		31-57-34
9WT2	SGU-ECAM, 2	93VU	122		31-57-34
10WW	ANNUNCIATOR-ECAM/FWC2 FAULT	470VU	212		
11WW	ANNUNCIATOR-ECAM/FWC1 FAULT	470VU	212		
13WT	P/BSW-ECAM/DISPLAYS	470VU	212		
16WT	P/BSW-ECAM/BITE	470VU	212		
13WW	P/BSW-ECAM/INPUTS	470VU	212		
15WW	P/BSW-NORM CANCEL	417VU	210		
16WW	SWITCH-EMER CANCEL	417VU	210		
17WW	LOUDSPEAKER-CAPT		211		31-53-25
18WW	LOUDSPEAKER-F/O		212		31-53-25
36WW	LIGHT-MASTER WARN, CAPT	3VU	210		
37WW	LIGHT-MASTER CAUTION, CAPT	3VU	210		
38WW	LIGHT-MASTER WARN, F/O	5VU	210		
39WW	LIGHT-MASTER CAUTION, F/O	5VU	210		
41WW	TRANSMITTER-THS POSITION	9VU	120		31-53-15







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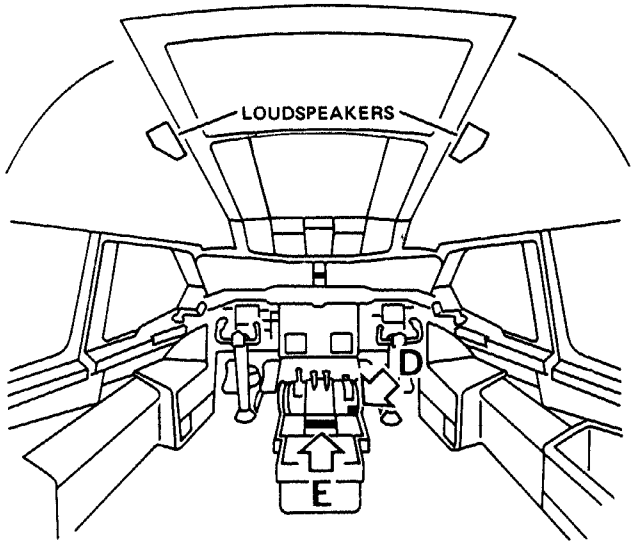
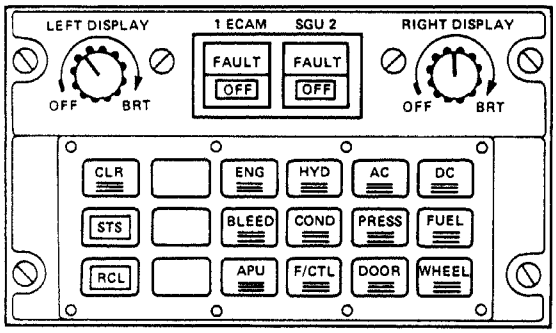
ECAM System - Component Location in the Flight Compartment Sheet 1/3
Figure 001

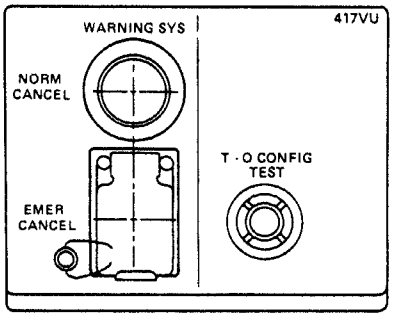


E

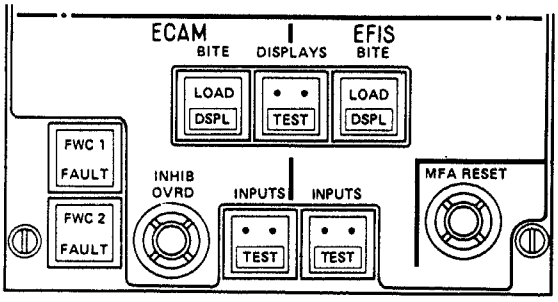


ECAM CONTROL PANEL

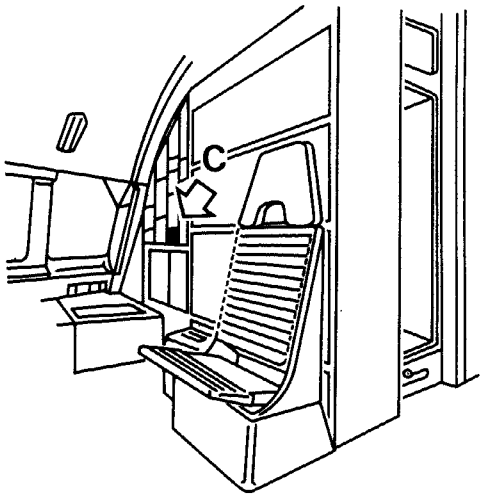
D



C



ECAM MAINTENANCE PANEL



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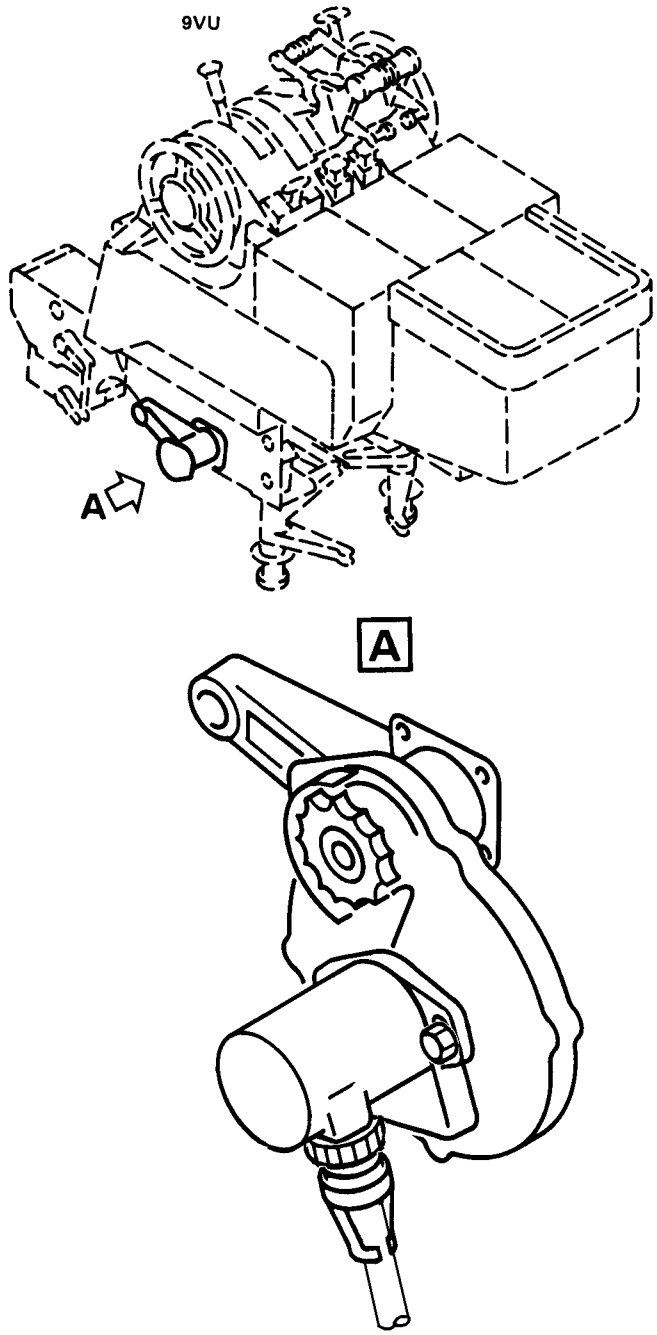
ECAM System - Component Location in the
Flight Compartment Sheet 2/3
Figure 002



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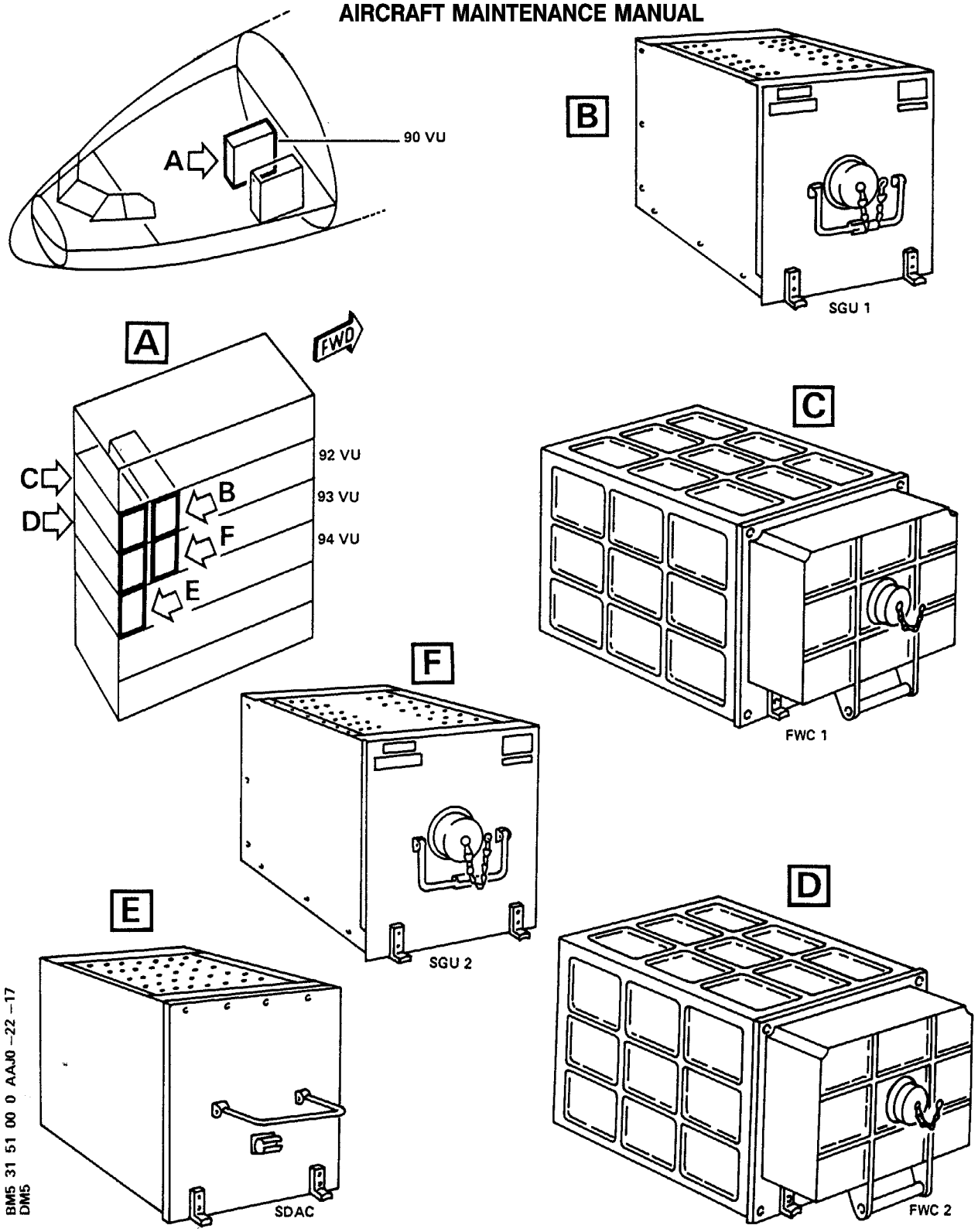
ECAM System - Component Location in the
Flight Compartment Sheet 3/3
Figure 003



ECAM System - Component Location in the Avionics Compartment
Figure 004

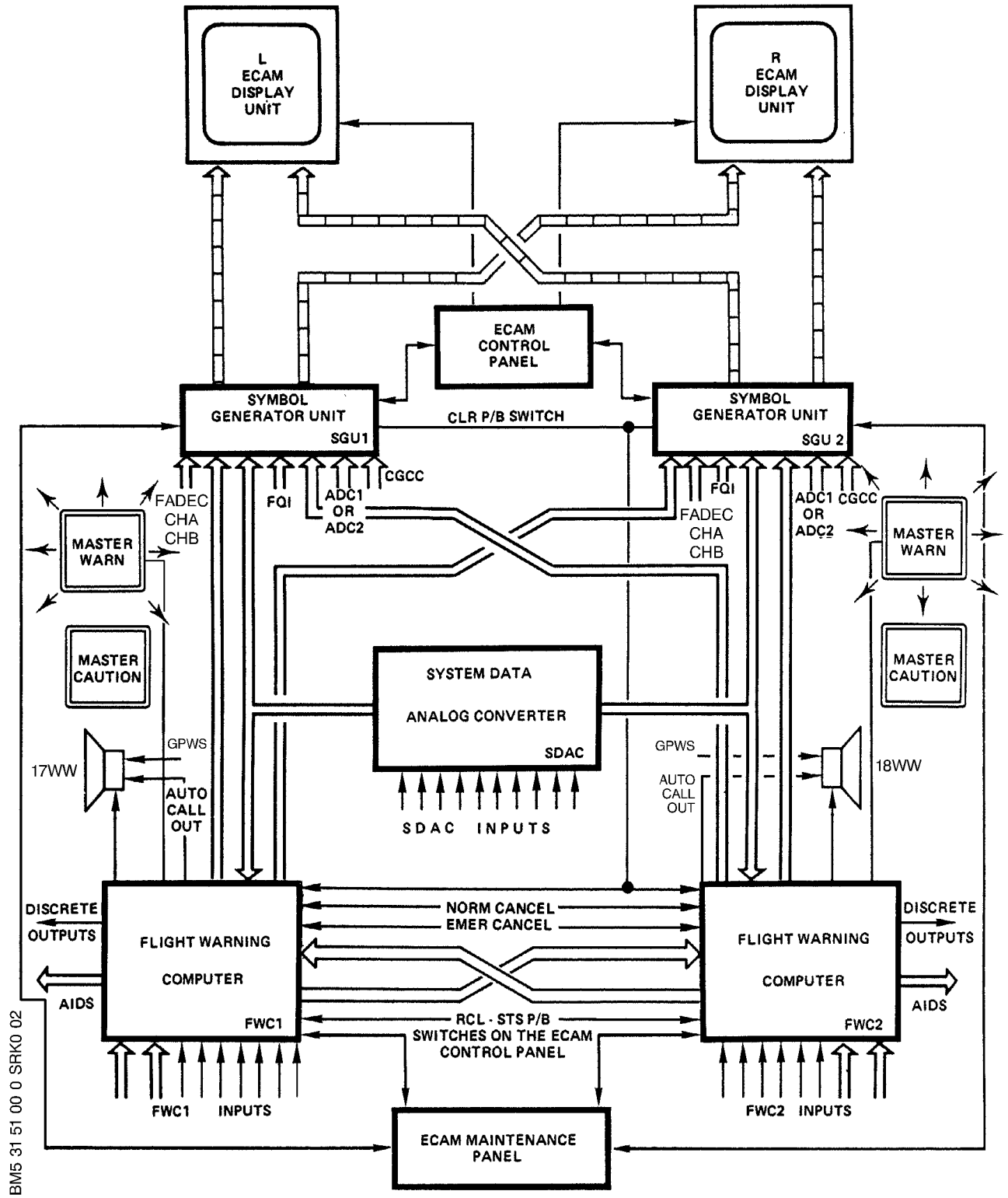
3. ECAM System Architecture

(Ref. Fig. 005)

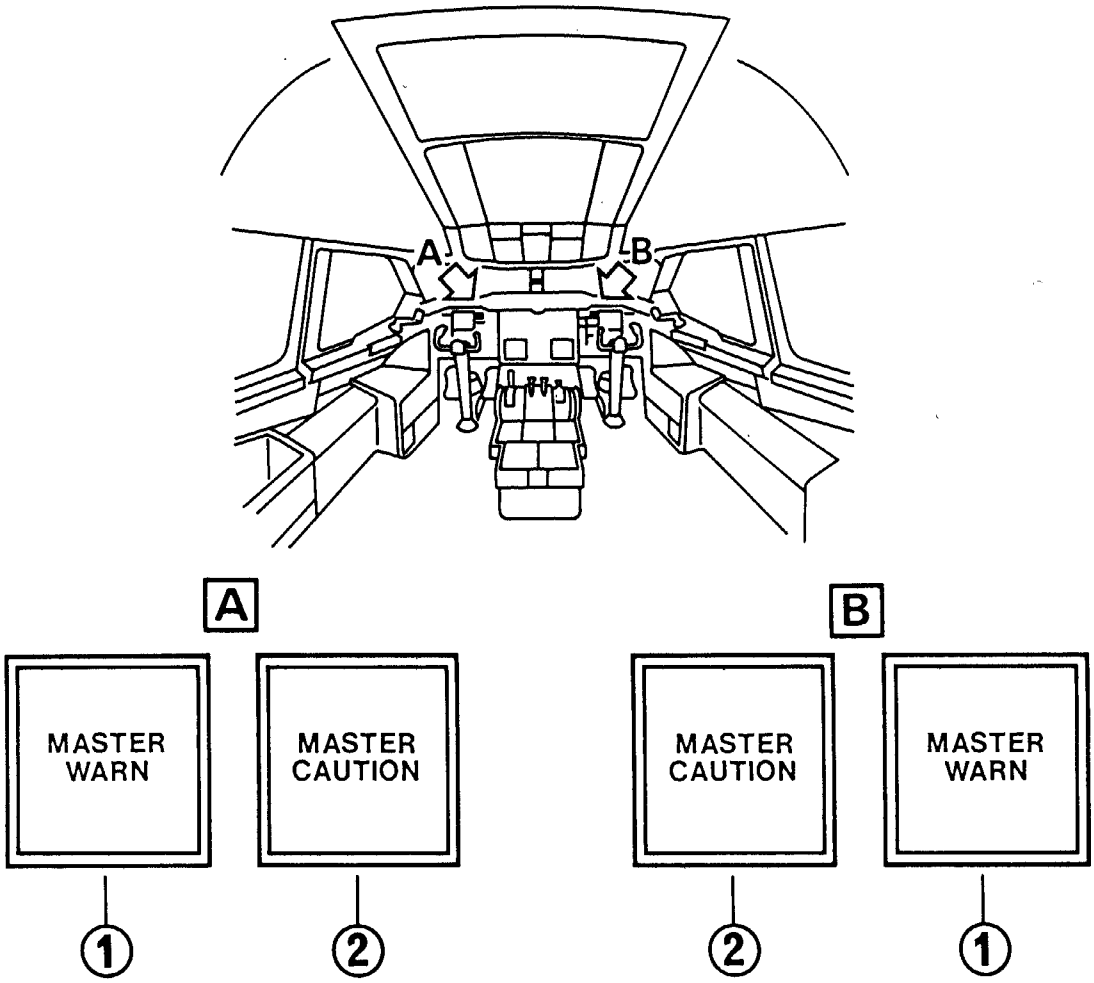
The ECAM system consists of :

- Two FWCs (Flight Warning Computer) which acquire the aircraft systems data to process warning indications and the status functions. The critical failure warning signals (mainly identified by red lights) supply each FWC. The other signals (mainly identified by amber lights) are split between the two FWCs with an exchange of data through a cross-talk bus.
  The FWCs generate also the aural warning signals, the vocal information (Automatic Callout Function), the MASTER lights control signals, the stick shaker control signals, the AFS warning signals and the data for the AIDS system.
- A SDAC (System Data Analog Converter) which acquires various analog and discrete data and converts them into digital form necessary for further processing.
  The SDAC has a complete capacity of :
  200 discrete inputs
  150 analog inputs
- Two SGUs (Symbol Generator Unit) which process outputs from both FWCs, CGCC, SDAC, TPIS, ADC and FQI systems in order to present either system displays or various messages.
- Two full-color shadow-mask high-resolution CRT display units which present system displays and messages.
  The ECAM display units are interchangeable with the EFIS display units. (Ref. 34-70-00, P. Block 001).
- 2 MASTER WARN and MASTER CAUTION lights (P/B switches) which provide visual warning signals. (Ref. Fig. 006).
- An ECAM control panel (Ref. Fig. 007, 008) which allows the crew to :
  - clear warning presentation by pressing the CLR pushbutton switch
  - call manually the STATUS function by pressing the STS pushbutton switch
  - play back the failure sequence by pressing the RCL pushbutton switch
  - select manually a system display.
- An audio interface with :
  - 2 loudspeakers
  - 1 NORM CANCEL pushbutton switch (Ref. Fig. 010)
  - 1 EMER CANCEL switch (Ref. Fig. 010)
- An ECAM maintenance panel (Ref. Fig. 009) which is used for all maintenance operations and trouble-shooting on ground.

NOTE : - each FWC has the complete capacity to acquire and process all the critical failure warning signals.
- each FWC has the complete capacity to process all the non critical failure warning signals.
- each FWC has only the half capacity to acquire the non critical failure warning signals.
- each SGU has the capacity to drive both ECAM display units.



ECAM System - Block Diagram
Figure 005



1 - RED MASTER WARN LIGHTS - FLASHING - REQUIRE IMMEDIATE CREW ACTION.

IN THE EVENT OF RED WARNING, PRESSING ONE MASTER WARN LIGHT CAUSES BOTH MASTER WARN LIGHTS TO GO OFF AND AURAL WARNING FOR WHICH THE INHIBITION IS AUTHORIZED BY THE OFFICIAL RULES TO BE STOPPED.

2 - AMBER MASTER CAUTION LIGHTS - STEADY - ACTION TO BE PERFORMED DEPENDS ON CREW DECISION.
IN THE EVENT OF AMBER WARNING PRESSING ONE MASTER CAUTION LIGHT CAUSES BOTH MASTER CAUTION LIGHTS TO GO OFF.

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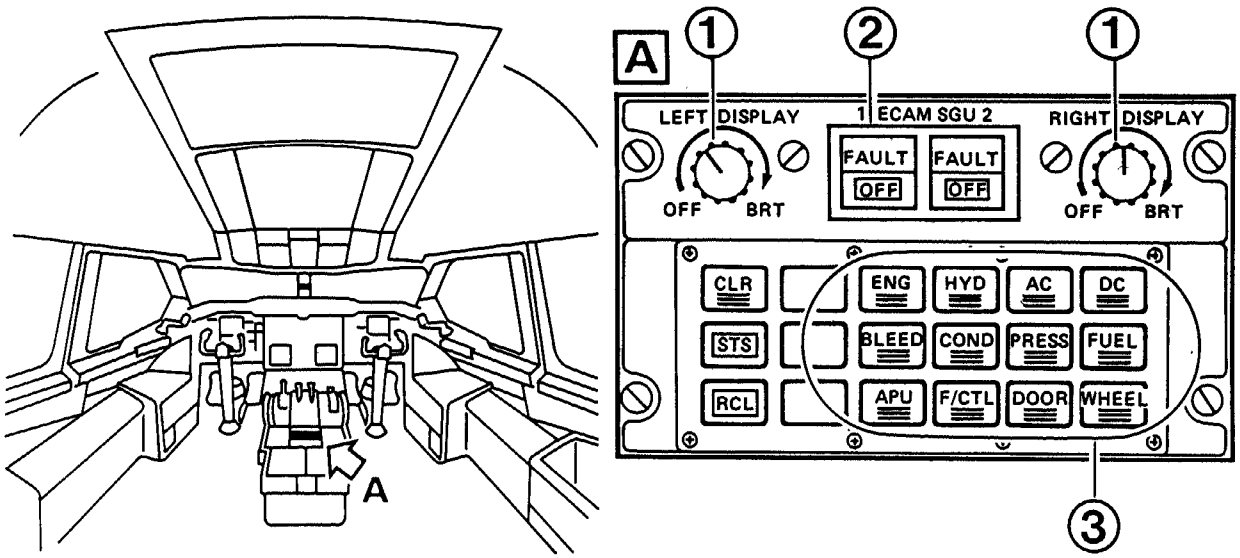
MASTER WARN and MASTER CAUTION Lights
Figure 006



1 - TWO CONTROL SWITCHES ENABLE EACH ECAM DISPLAY UNIT TO BE SWITCHED ON AND THE BRIGHTNESS OF THE IMAGES TO BE ADJUSTED.

2 - ECAM SGU1 AND SGU2 P/B SWITCH LEGENDS ARE OFF IN NORMAL OPERATION.
THE FAULT LEGEND COMES ON AMBER IF A FAILURE IS DETECTED BY THE SGU INTERNAL SELF TEST.
RELEASING THE SGU1 OR 2 P/B SWITCH SWITCHES OFF THE CORRESPONDING SGU. CAUSES THE FAULT LEGEND TO GO OFF AND THE OFF LEGEND TO COME ON WHITE.
BOTH ECAM DISPLAY UNITS ARE DRIVEN BY THE AVAILABLE SGU.

3 - SYSTEM P/B SWITCHES ALLOW THE MANUAL SELECTION OF SYSTEM SYNOPTIC DIAGRAM DISPLAY ON THE R DISPLAY UNIT.
DISENGAGEMENT IS OBTAINED MANUALLY WHEN THE SYSTEM P/B SWITCH WITH LT ON OR ANOTHER ONE IS PRESSED OR AUTOMATICALLY WHEN A WARNING OR AN ADVISORY OCCURS.
IN SINGLE DISPLAY CONFIGURATION, MANUAL SELECTION IS NOT POSSIBLE IF A WARNING OR A STATUS MESSAGE IS DISPLAYED.

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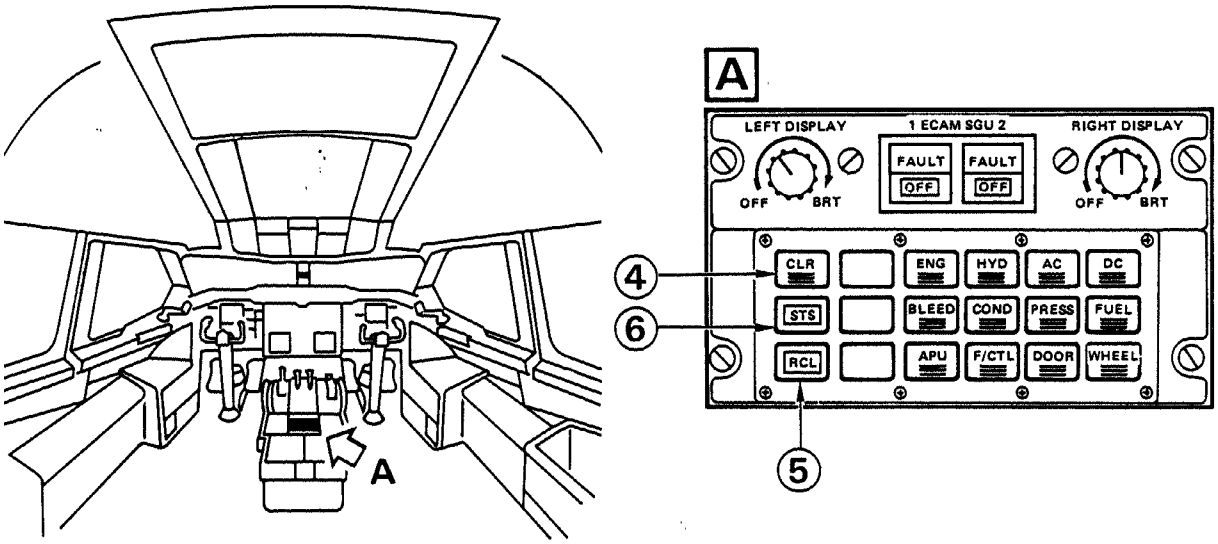
ECAM Control Panel (1/2)
Figure 007



4 - CLR P/B SWITCH LT COMES ON WHITE AS LONG AS A WARNING OR STATUS MESSAGE IS PRESENT ON THE L ECAM DISPLAY UNIT.
PRESS AS MANY TIMES AS NECESSARY THE CLR P/B SWITCH UNTIL CLR LT GOES OFF TO CHANGE THE MESSAGES DISPLAYED AND EXTINGUISH THE MASTER WARN AND MASTER CAUTION LIGHTS.

5 - RCL P/B SWITCH ENABLES THE WARNING MESSAGES PREVIOUSLY CLEARED TO BE DISPLAYED AGAIN PROVIDED THE CONDITIONS WHICH GAVE RISE TO THEM ARE STILL PRESENT. RECALL IS POSSIBLE EVEN IF THE WARNINGS ARE FLIGHT PHASE INHIBITED PRESSING THE RCL P/B SWITCH CAUSES THE CLR P/B SW LT COME ON.
IF THE FAILURE HAS DISAPPEARED THE MENTION NORMAL IS DISPLAYED ON THE L ECAM DISPLAY UNIT.

6 - STS P/B SWITCH ENABLES A STATUS MESSAGE (AIRCRAFT STATUS) TO BE CALLED MANUALLY IF NO WARNING IS DISPLAYED. PRESSING THE STS P/B SWITCH CAUSES THE CLR P/B SW LT TO COME ON. THE STATUS MESSAGE IS SUPPRESSED AUTOMATICALLY IF A WARNING OCCURS OR MANUALLY IF THE CLR P/B SWITCH IS PRESSED. THE STS P/B SWITCH LEGEND DOES NOT COMES ON. STATUS MESSAGES ARE NOT DISPLAYED DURING FLIGHT PHASES 1 AND 12. (REF. FIG. 016).

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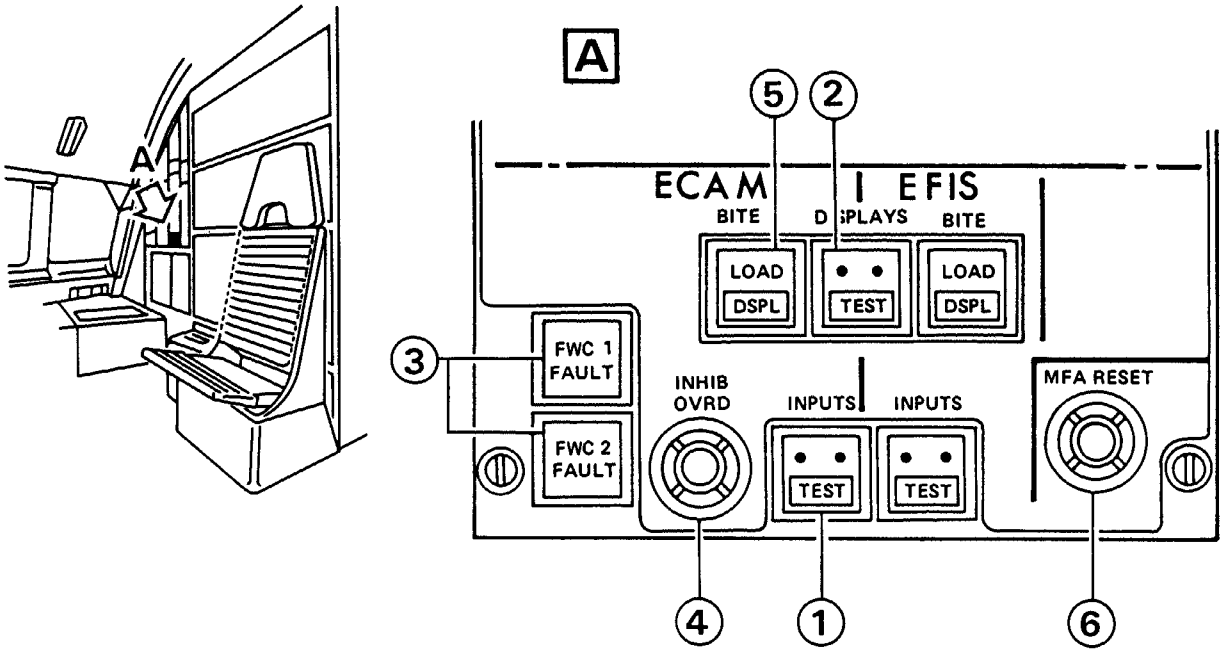
ECAM Control Panel (2/2)
Figure 008



1 - INPUTS P/B SWITCH
PRESSING IT CAUSES THE TEST LEGEND TO COME ON WHITE AND INITIATES THE INPUTS BITE TEST. THE WRONG INPUTS OF THE ECAM SYSTEM APPEAR IN CODED FORM ON THE ECAM DISPLAY UNITS. (ONLY DURING FLIGHT PHASES 1 AND 12).

2 - DISPLAYS P/B SWITCH.
PRESSING IT CAUSES THE TEST LEGEND TO COME ON WHITE AND INITIATES THE SGUs INTERNAL SELF TEST. THIS TEST ENABLES THE DISPLAY QUALITY TO BE CHECKED. A TYPICAL TEST PATTERN APPEARS ON EACH, ECAM DISPLAY UNIT. INHIBITED FROM FLIGHT PHASES 4 TO 10).

3 - FWC1/FWC2 FAULT MFA'S COME ON WHITE WHEN THE CORRESPONDING LRU FAILS, PROVIDED THAT ANN LT SWITCH IS PLACED IN READ POSITION (472VU).

4 - INHIB OVRD P/B SWITCH ALLOWS THE PRESENTATION OF WARNINGS INHIBITED ON GROUND, WHEN BOTH ENGINES ARE SHUT DOWN (FLIGHT PHASE 1).

5 - BITE P/B SWITCH
LOAD LEGEND OF BITE P/B SWITCH COMES ON EACH TIME AN INTERNAL FAILURE EVENT IS MEMORIZED IN THE BITE MEMORIES OF SGU1 (AND 2) AND FWC1 (AND 2) PROVIDED THAT ANN LT SWITCH IS PLACED IN READ POSITION.
ENGAGEMENT OF THE BITE DISPLAY FUNCTION WILL CALL SGU1(2) AND FWC1(2) BITE MEMORY CONTENTS ON LEFT AND RIGHT DISPLAY UNITS (ONLY DURING FLIGHT PHASES 1 AND 12)

6 - MFA RESET P/B SWITCH ALLOWS TO EXTINGUISH ALL THE MEMORIZED FAULT ANNUNCIATORS (MFA) LOCATED ON PANEL 470VU. ON THIS FIGURE, ONLY FWC1 AND FWC2 FAULT MFA'S ARE CONCERNED.

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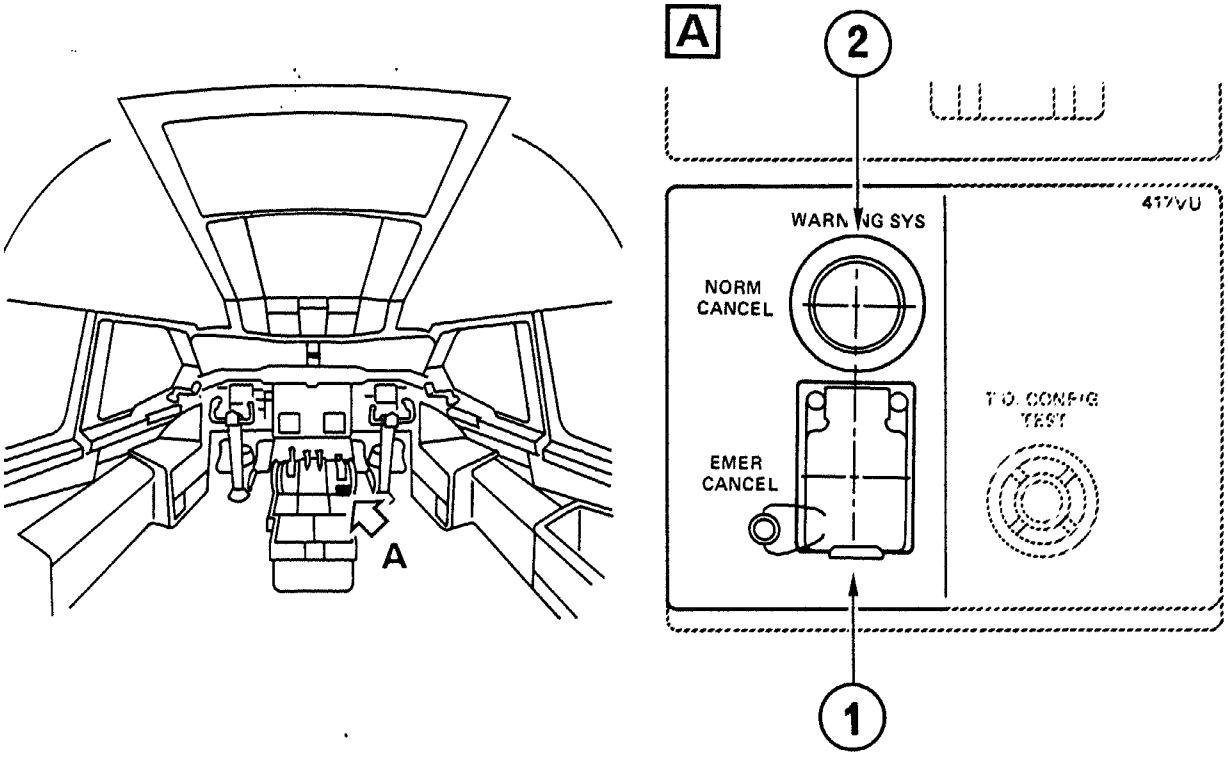
ECAM Maintenance Panel
Figure 009



1 - EMER CANCEL GUARDED SWITCH ENABLES CANCELLATION OF ANY AMBER WARNING AND CONTINUOUS AURAL WARNINGS IT HAS TO BE USED IN CASE OF RANDOM AND REPETITIVE WARNINGS WHICH WILL PRODUCE AN OPERATIONAL NUISANCE.

2 - NORM CANCEL P/B SWITCH ENABLES CANCELLATION OF AURAL WARNINGS FOR WHICH THE INHIBITION IS AUTHORIZED BY THE OFFICIAL RULES.

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WARNING SYS Panel
Figure 010

4. Power Supply

(Ref. Fig. 011)

The L ECAM display unit and the SGU1 are both supplied with 115VAC 400 Hz ; they are fed by the AC NORM busbar 105 XP-B respectively through the circuit breakers 7WT and 11WT1.

The R ECAM display unit and the SGU2 are both supplied with 115VAC 400 Hz ; they are fed by the AC NORM busbar 205 XP-B respectively through the circuit breakers 8WT and 11WT2.

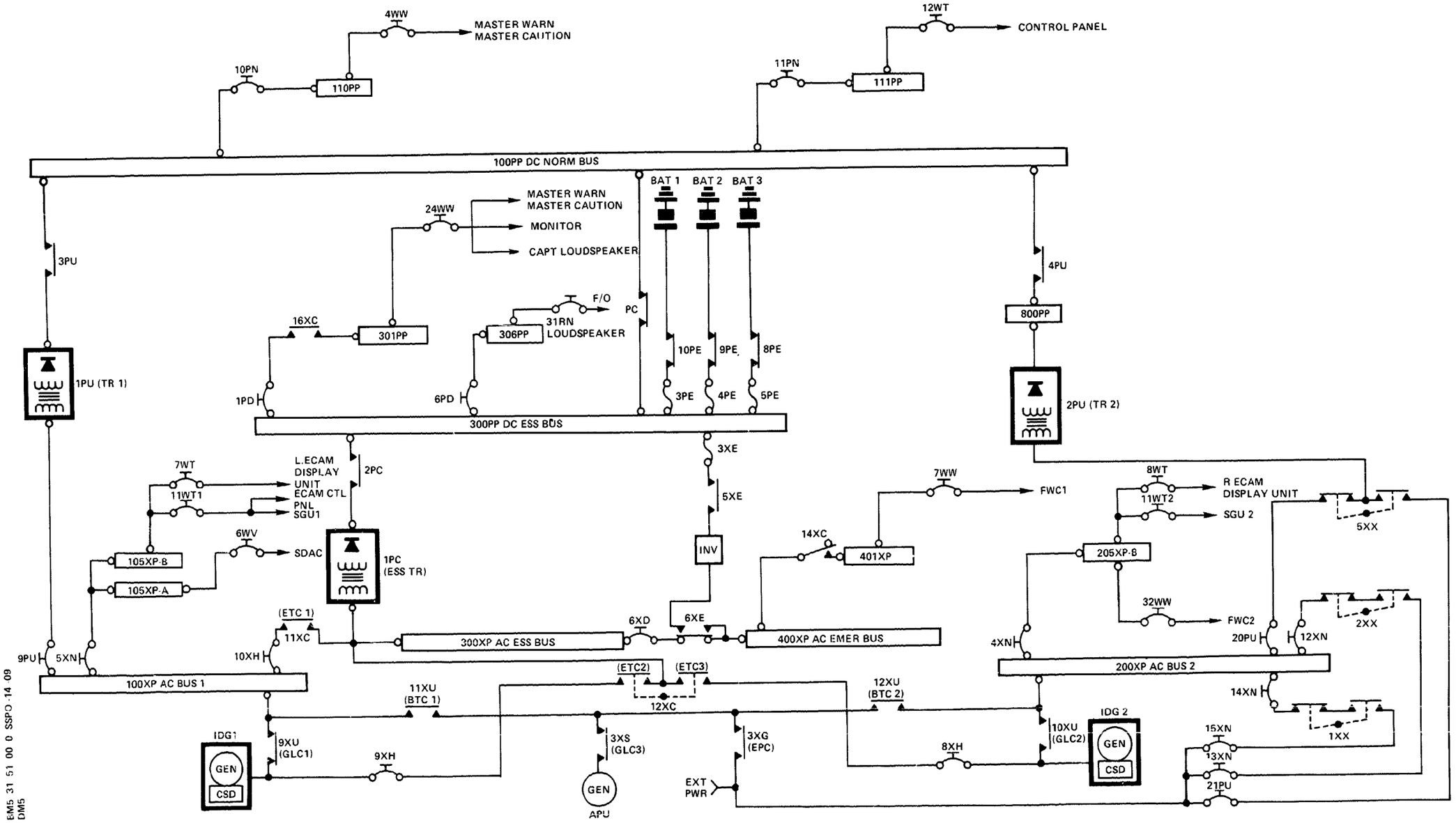
The SDAC is fed by the AC NORM busbar 105 XP-A (115VAC 400 Hz) through the circuit breaker 6WV.

The ECAM control panel is supplied with 28VDC by the DC NORM busbar 111PP through the circuit breaker 12WT and also with 115VAC by the AC NORM busbar 105 XP-B through the circuit breaker 11WT1 for the supply of the lamps illumination logic circuit.

The FWC1 is supplied with 115VAC 400Hz, from the AC EMER busbar 401 XP through the circuit breaker 7WW. The FWC2 is supplied with 115VAC 400Hz, from the AC NORM busbar 205 XP-B through the circuit breaker 32WW.

The MASTER WARN and MASTER CAUTION lights are supplied with 28VDC by DC NORM busbar 110PP and DC ESS busbar 301 PP, through circuit breakers 4WW and 24WW.

The DC power supply is only used for control panel light illumination, MASTER WARN and MASTER CAUTION lights and loudspeakers.



ECAM System Power Supply
Figure 011

5. ECAM Functions

A. Basic Principles

The two following principles have been adopted

(1)Flight compartment "lights out" philosophy

In normal operation all the lights are off. The use of lights to indicate correct operation is limited to a minimum (green illumination for normal position according to FAR 25.1322).

(2)Detection sequence

The detection sequence is composed of three distinct phases :

PHASE	FUNCTION	MEANS OF DETECTION
1	Warning	Aural warning
2	Identification	MASTER lights
3	Isolation	Detailed display (+local lights on control panel)

B. ECAM Data Definition

(1)Lights

The following color coding is established on the basis of FAR 25-1322 recommendations.

INDICATION	COLOR	INTERPRETATION
WARNING	RED	Configuration or failure requiring immediate action
	AMBER	Configuration not requiring immediate action. Time for taking action will be left to the crew's discretion
INDICATION	GREEN	Normal operation
	BLUE	Normal transient configuration
	WHITE	Control position indication Neutralized abnormal configuration

(2)CRT displays
Due to shadow mask CRT displays color coding is implemented with the following general rules :

COLOR	WARNING	SYSTEM
RED	EMERGENCY	EMERGENCY
AMBER	ABNORMAL	ABNORMAL
AMBER	DATA NOT AVAILABLE "NO ACTION FEEDBACK"	DATA NOT AVAILABLE FLAG "XX"
CYAN	ACTION TO BE TAKEN LIMITATIONS AND PROCEDURES	UNITS
WHITE	ACTION PERFORMED	TITLE "ADV" INSCRIPTIONS
GREEN	INFORMATION	NORMAL FUNCTIONING PARAMETERS IN NORMAL RANGE
MAGENTA	LDG INHIB STATUS T.O INHIB	

(3)Aural warnings
Two types of warnings processed by the FWCs are used
- non specific warnings always associated with MASTER lights
- specific warnings associated or not with MASTER lights
(Ref. Fig. 012)

WARNINGS	FWC AURAL WARNINGS	AURAL CANCELLATION
SYSTEM FAILURE AMBER WARNINGS	SINGLE CHIME SC	AUTO
FIRE	CONTINUOUS REPETITIVE CHIME CRC 250ms	NORM CANCEL OR FIRE HANDLE PULLED
SYSTEM FAILURE RED WARNINGS	CONTINUOUS REPETITIVE CHIME CRC	NORM CANCEL
LANDING GEAR	APPROACH : CONTINUOUS REPETITIVE CHIME CRC	NORM CANCEL
	LANDING : CONTINUOUS REPETITIVE CHIME CRC	NIL*
CONFIGURATION	CONTINUOUS REPETITIVE CHIME CRC	NIL*
OVERSPEED	CONTINUOUS REPETITIVE CHIME CRC	NIL*
LANDING CAPABILITY CHANGE	CLICK 3 PULSES	AUTO
AUTO PILOT DISCONNECTION	CAVALRY CHARGE 1 s ON - 3 s OFF	INSTINCTIVE DISCONNECT 1 SEC MIN
CALLS	SELCAL : BUZZER 1 s ON 1 s OFF CABIN : BUZZER	NORM CANCEL AUTO
STALL	CRICKET	NIL*

GPWS	WHOOP WHOOP PULL UP**	NIL*
STAB IN MOTION	WHOOLER**	NIL*

* CAN ONLY BE CANCELLED BY CORRECTIVE ACTION OR BY USE OF THE EMER CANCEL SWITCH
** GENERATED BY DEDICATED UNITS

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Aural Warnings
Figure 012

(4)Vocal information, Automatic Call-out function : (Ref. Fig. 013)

The Automatic Call-out function, processed in the FWCs, provides vocal radio height (H) in formation.

The system is operational for radio height lower than 400 ft.

This Automatic Call-out function is inhibited for H ≤ 3ft. and during climbing trajectory.

The radio height vocal information is triggered by the result of the comparison between radio height values and the following memorized values

	Memorized Height Threshold	Vocal Information
R	400	Four Hundred
	300	Three Hundred
R	200	Two Hundred
R	100	One Hundred
	50	Fifty
	40	Forty
	30	Thirty
	20	Twenty
	10	Ten
	5	Five

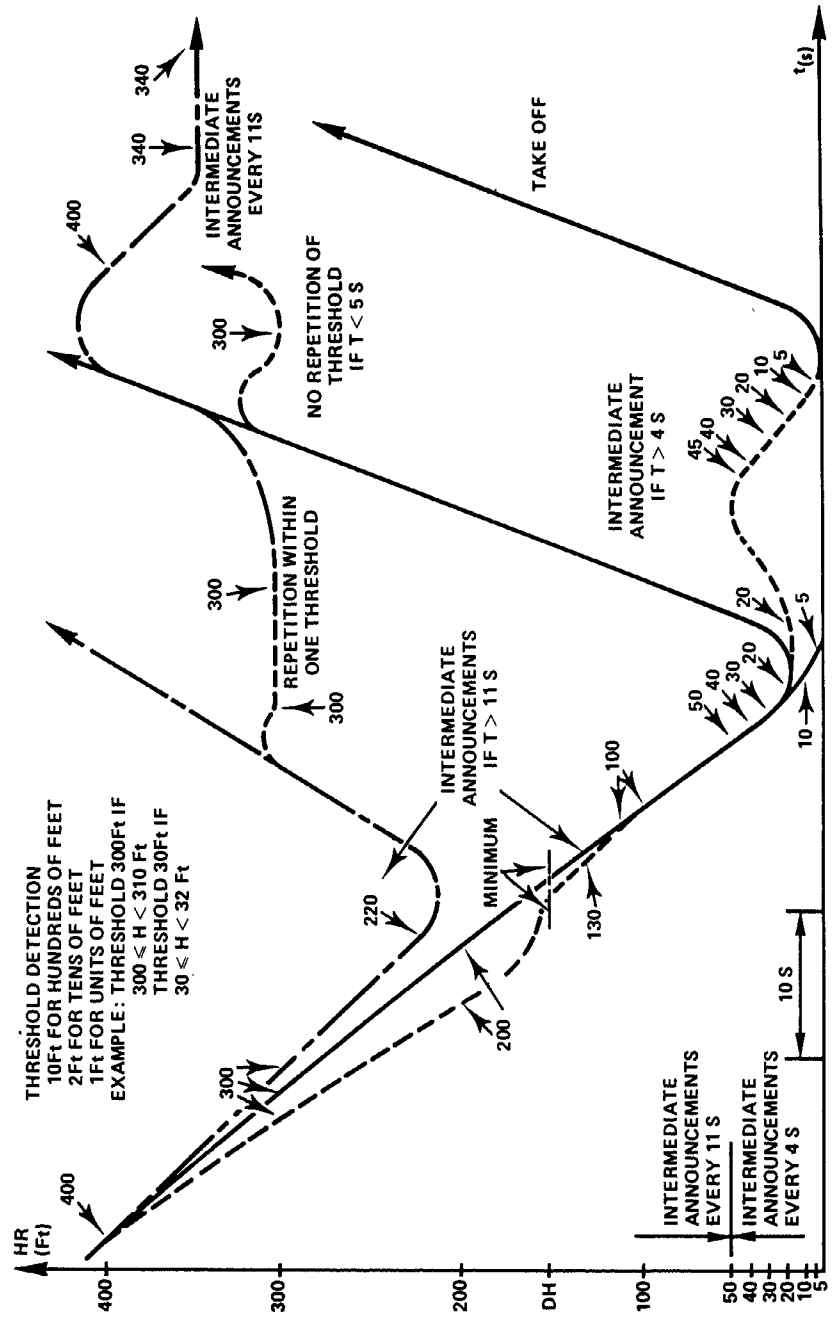
If a new height threshold detection does not occur Ts after the previous detection, the system provides intermediate height vocal information (T = 4s for H ≤ 50ft and T = 11s for H > 50ft).

Between 100 and 400ft. the height value is rounded off to the lower ten.

To prevent nuisances from ground configuration the 400, 300, 200, 100 thresholds cannot be repeated less than 5 s after a previous emission.

By aircraft wiring, the Automatic Call-out function provides the following possibilities :

- inhibition of any memorized Height Threshold
- "PLUS HUNDRED" 100 ft. above selected DH.
- Priority of the ground proximity warning system over the automatic call-out function.



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Automatic Call-out-Configurations
Figure 013

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C. Warning Definition

(1)Types of warnings

There are three distinct types of warnings :
- warning associated with an independent failure,
- warning associated with a primary failure,
- warning associated with a secondary failure.

(a)Independent failure

This is a failure which affects an isolated item of equipment or system without affecting the other items of equipment or systems on the aircraft.
e.g. fuel pump failure.

(b)Primary failure

This is a failure of an item of equipment or system causing the loss of other items of equipment on which it depends.
This configuration constitutes a cascade of failures all originating from the same primary failure.
e.g. : ADC 1 failure leads to the loss of :
- pitch trim 1
- yaw damper 1
- ATS OFF
- anemometrics information on Captain's instruments.

(c)Secondary failure

This is the loss of an item of equipment or system resulting from a primary failure.
This apparent failure could, in some cases, disappear after corrective crew action.
e.g. loss of a fuel pump resulting from a power supply busbar failure, cured by electric transfer.
NOTE : Different failures combination may occur sequentially or simultaneously.

(2)Warning Levels

System operation complies with ARP 450 D.
In order to achieve this, the warnings are classified in 4 levels according to the importance and urgency of the corrective action required.

(a)Level 3

This corresponds to an emergency configuration
Corrective or palliative action must be taken immediately by the crew.
The following warnings fall into this category :
- aircraft in dangerous configuration or limit flight conditions,
- system failure altering the flight conditions,
- serious system failure.

These warnings are provided by a continuous repetitive chime (CRC) or by specific aural warnings and illuminate the MASTER WARN lights (+local lights on the overhead panel).
They lead to a display on the CRT.

(b)Level 2

This corresponds to an abnormal configuration of the aircraft.
Immediate corrective action is not required.
The crew must decide how soon action has to be taken.
This level mainly comprises :
- system failures having no direct consequences on safety.

These warnings are identified by MASTER CAUTION lights (and Local lights on the overhead panel) and are provided at the same time as a single chime (SC).
They lead to a display on the CRT.

(c)Level 1

This corresponds to a warning configuration requiring crew monitoring ; that is, mainly failures leading to a loss of redundancy or degradation of a system.
These warnings are sometimes identified by amber local lights on control panels without a chime. They lead to a display on the CRT.

(d)Level 0

This corresponds to an information configuration and requires no special action.
This configuration is provided by blue, green and white local lights on the control panels.

NOTE : Level 3 has priority over level 2 which in turn has priority over level 1.
An order of priority between warnings is also defined within each level as follows :

	WARNING	MASTER WARN	AURAL WARNING	CRT DISPLAYS PRESENTATION	PILOT ACTION
	1 - STALL WARNING	NO	CRICKET	No (Stick shaker)	I
	- OVERSPEED	YES	CRC	Warning message only	M
	- T.O CONFIG	YES	CRC	Warning message only	M
	2 - ENGINE FIRE	YES	CRC	Message + synoptic	E
L				diagram	D
E	3 - APU FIRE	YES	CRC	Message + synoptic	I
V				diagram	A
E	4 - ENG OIL LO	YES	CRC	Message + synoptic	T
L	PRESS			diagram	E
	5 - EXCESSIVE CABIN	YES	CRC	Message + synoptic	
3	ALT.			diagram	A
	6 - SMOKE	YES	CRC	Message + synoptic	C
				diagram	T
	7 - DUAL HYD	YES	CRC	Message + synoptic	I
	FAILURE			diagram	O
	8 - DUAL SERVO	YES	CRC	Message + synoptic	N
	FAILURE			diagram	
	9 - AUTOPILOT	YES	cavalry	Warning message only	
	FAILURE		charge		
	10 AUTOLAND	NO	click 3	No (local warning	
			pulses	light)	
	11 - LANDING GEAR	YES	CRC	Warning message only	
		WARN	WARNING	PRESENTATION	ACTION
	12 - EXCESS AFT CG	YES	CRC	Message + synoptic	
				diagram	

NOTE : The three first warnings (1) never occur simultaneously.
Level 3 warnings are always associated with an independent failure (except dual servo-controls and dual hydraulic failures).

		WARNING	MASTER CAUTION	AURAL WARNING	PILOT ACTION
R		FWS	YES	SC	IMMEDIATE ATTENTION
		ENGINE	YES	SC	IMMEDIATE ATTENTION
		HYDRAULICS	YES	SC	IMMEDIATE ATTENTION
		ELECTRICS	YES	SC	IMMEDIATE ATTENTION
	L	SERVO CONTROLS	YES	SC	IMMEDIATE ATTENTION
	E	APU	YES	SC	IMMEDIATE ATTENTION
	V	NAV ADC	YES	SC	IMMEDIATE ATTENTION
	E	FLIGHT CONTROLS	YES	SC	IMMEDIATE ATTENTION
	L	ATS	YES	SC	IMMEDIATE ATTENTION
		BRAKES	YES	SC	IMMEDIATE ATTENTION
	2	LANDING GEAR - WHEEL	YES	SC	IMMEDIATE ATTENTION
		FUEL	YES	SC	IMMEDIATE ATTENTION
		AIR BLEED	YES	SC	IMMEDIATE ATTENTION
		ANTI ICE	YES	SC	IMMEDIATE ATTENTION
		AIR CONDITIONING/CABIN PRESS	YES	SC	IMMEDIATE ATTENTION
		DOORS	YES	SC	IMMEDIATE ATTENTION
		LOOPS	YES	SC	IMMEDIATE ATTENTION
	L E V E L 1	Same priority order as level 2 warnings	NOTHING	NOTHING	ATTENTION
	L E V E L 0	Same priority order as level 1 and 2 warnings	NOTHING	NOTHING	INFORMATION

NOTE : Level 2 warnings can be associated with independent, primary or secondary failures.
Level 1 warnings can be associated with independent or secondary failures. Level 0 warnings are always of independent type.

D. Warning Inhibition
In order to avoid warnings when not desired, inhibition follows the rules hereafter :

- ensure proper warnings only when necessary ; a warning or indication which has no signification on a given configuration is not activated. (e.g. hydraulic low pressure warning is inhibited before engine starting)
- avoid warnings without interest for a flight phase.
  An inhibition logic filters the presentation of warnings according to the flight phase (Ref. Fig. 014)

E. Clear and Recall Function

The clear function allows the crew to clear warning presentation when corrective actions have been performed.
This function is triggered from the ECAM Control Panel - (Ref. para 5.J.).
The recall facility allows the crew to reactivate the presentation of a warning inhibited by the flight phase or previously cleared (if warning condition is still present).

NOTE : 1 - Pressing the **INHIB OVRD P/B** switch on the **ECAM** maintenance panel cancels the warning inhibition during flight phases 1 and 12.
The **INHIB OVRD** mode is self maintained until either a new flight phase is computed or all warnings cleared.

2 - Without any recall action, a cleared warning can be redisplayed if the warning condition disappears and then appears again. This could lead to an operational nuisance, the emergency cancel function enables this to be prevented (Ref. para. 5. G).

3 - Once the **RCL P/B** switch is pressed, the inhibition of warnings by the current flight phase is cancelled.
Furthermore, **LDG INHIB** or **T.O. INHIB** message, if present, disappears.

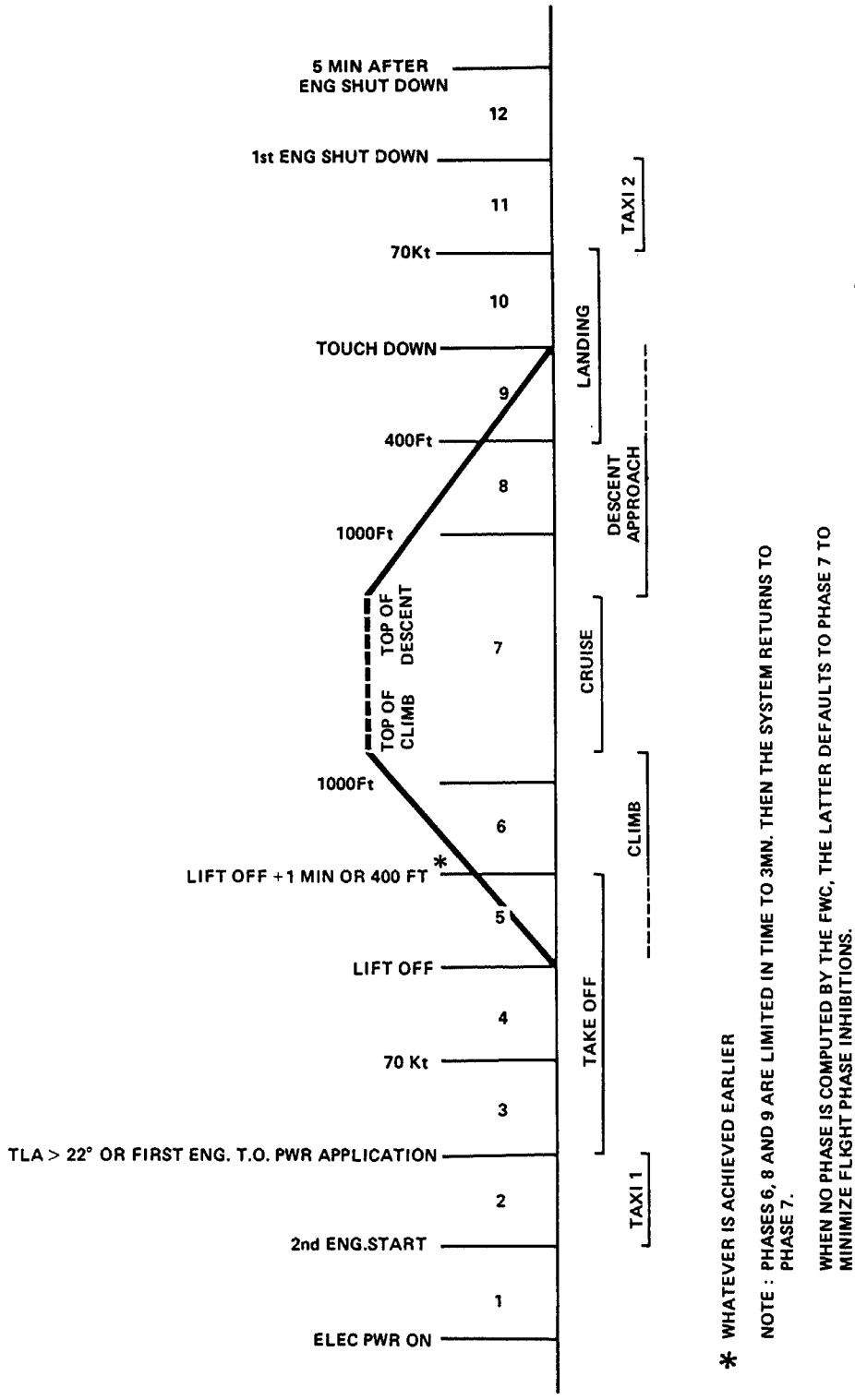
F. **MASTER** Lights and Aural **NORM** Cancel Function

Red **MASTER WARN** and amber **MASTER CAUTION** lights are installed on the Captain and First Officer instrument panels (Ref. Fig. 006). They receive control signals from the two **FWC**s as follows :
- level 3 warnings control the **MASTER WARN** lights
- level 2 warnings control the **MASTER CAUTION** lights

In the event of a level 3 warning, action on the **MASTER WARN** light will extinguish these lights and stop, in the same way as action on **NORM CANCEL P/B** switch (Ref. Fig. 010), the aural warning if its cancellation is authorized by the official rules :
- **FIRE ENG1, ENG2, APU**
- **SMOKE**
- **ENG1 (2) OIL LO PR**
- Excess Altitude
- Dual **HYD** Failure
- Dual **SERVO** Failure
- **EXCESS AFT CG**
- Landing gear not extended during the approach phase.

Inthe event of a level 2 warning, action on the **MASTER CAUTION** light will extinguish these lights. These cancel actions have no effect on **CRT** messages, they simply suppress the aural and visual distractions.

G. Emergency Cancel Function



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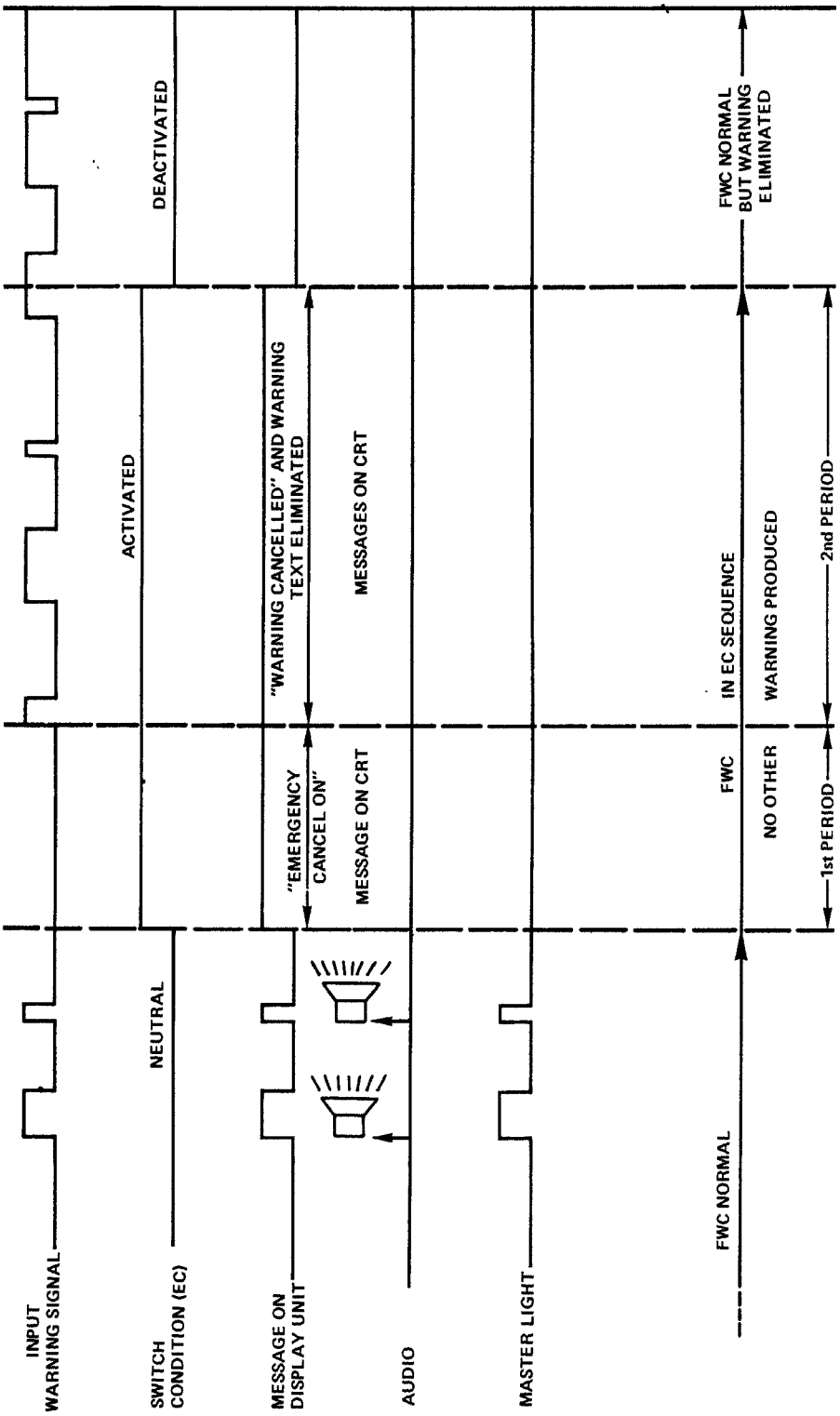
Flight Phase Definition
Figure 014

This function is activated by a guarded sealed **EMER CANCEL** switch at the rear of the center pedestal (Ref. Fig. 010), and enables cancellation of any amber warning (**CRT** display, sound and **MASTER** lights; of course local lights on control panels are not affected).
It acts in such a way as to ensure that once a warning is cancelled it remains cancelled even if the warning condition disappears and re-appears The following figure (Ref. Fig. 015) shows the operation of this function.
CRT messages are given to indicate that the switch is activated "**EMER CANCEL ON**" and that the specific warning is cancelled ("**CANCELLED WARNING**" followed by the entire text of the cancelled warning).
Selection of the specific warning is achieved by ensuring that the **EMER CANCEL** switch button is activated when the nuisance fault condition is present.
This function allows suppression of random and repetitive warnings (due to sensor failures ...) which could cause a considerable operational nuisance.
This cancel facility can be manually reset by pressing the **RCL P/B** switch on **ECAM** control panel for more than 3 s. Automatic reset occurs at the beginning of flight phase 1 or 12. Action on the **EMER CANCEL** switch allows cancellation of the warning displayed on the top of **CRT**.
Another action is necessary to cancel another warning.
For red warning, the **EMER CANCEL** switch acts as audio emergency cancel i.e. only aural warnings can be cancelled and, for insistance, if the red warning condition disappears and re-appears the associated aural warning is produced again.



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Emergency Cancel Function
Figure 015

H. Warning Distribution

The distribution of the different warnings between the two Flight Warning Computers enables segregation of the aircraft systems to be kept without affecting the detection of red warnings :

- Both computers receive all the signals required for generating level 3 warnings.
- For the other levels of warnings, each computer receives half of the required signals directly while the other half is transmitted by the other computer through an exchange bus.
- If only one computer is operating : (Aural warning provided if warning is processed).
  . All red warnings are processed, displayed on CRT and illuminate the MASTER WARN lights
  . Some of the amber warnings are processed and illuminate the MASTER CAUTION lights. (Only for level 2 warnings).

Nevertheless these processed warnings lead to an indication on the CRT. These indications provide the type of failure. (Ref. Fig. 016).

- The tables hereafter give the distribution of warnings processed by each of the two FWCs when they are operating on their own.

(1)Warnings acquired by either FWC1 or FWC2 (i.e warnings which operate normally whatever the FWC remaining)

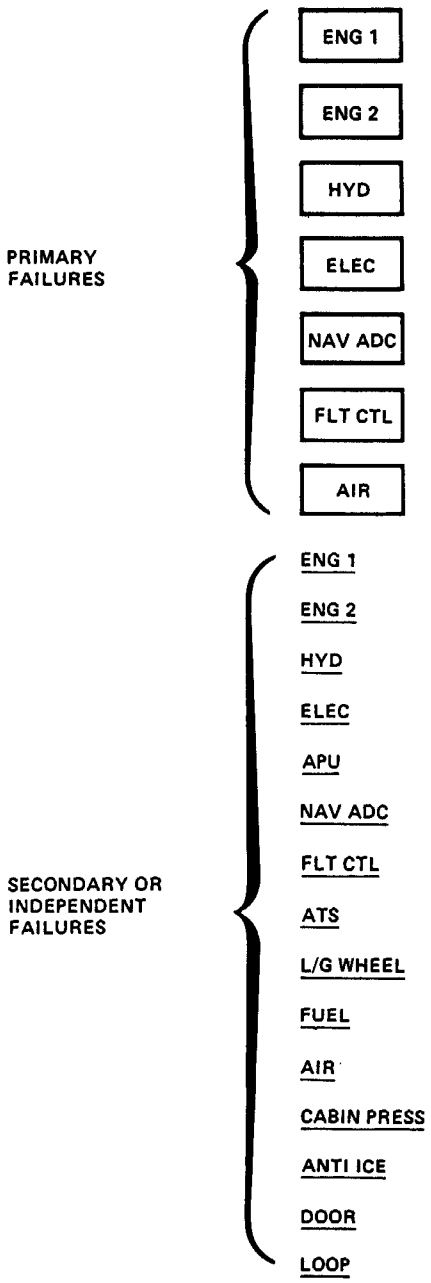
(a)Red warnings displayed on CRT and illumination of the MASTER WARN lights.

OVERSPEED VFE, VLE, VMO/MMO
TO CONFIG SLATS/FLAPS/PITCH TRIM/SPD BRK/PARKING BRK
FIRE ENG1, ENG2, APU
ENG1 (2) OIL LO PR
EXCESS ALT
SMOKE AVIONICS/MAIN BAY/BAT/AFT, FWD, BULK COMPT
DUAL HYD FAILURE
DUAL SERVO FAILURE
L/G NOT DN
AP OFF
EXCESS AFT CG

(b)Warnings without CRT message and MASTER lights not on.

R AUTOLAND (red) :
R BEAM DEV/LONG FLARE/DRIFT LOC BEAM/Below 200Ft AP OFF, RA DISCREPANCY
R STALL WARNING : Specific Aural Warning
R LAND CAPABILITY CHANGE : Specific Aural Warning
R ALTITUDE ALERT (amber) : Specific Aural Warning
R DECISION HEIGHT (amber) : Specific Aural Warning
SELCAL/CABIN CALL OR MECHANICAL CALL/EVAC SYSTEM

(c)Amber warning illuminating the MASTER CAUTION lights and leading to an indication or the CRT (Ref. Fig. 013) when only one computer is operating.



BM5 31 51 00 0 STNO 14 09
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Amber Warnings in Degraded Operation
Figure 016

HEADER	ASSOCIATED MESSAGE
FWS	(NOTE : Title on CRT when only one computer is operating.)
	FWC1 or 2 FAULT
	CRT AMBER CAUTION NOT AVAIL
	AMBER WARN - DEGRADED OPER
	AURAL WARN NOT AVAIL
ENG1 (2)	ENG1(2) FAIL
	ENG1(2) SHUT DOWN
	ENG TRIM FAULT
HYD	HYD PUMP LO PR B/G(1+2)/Y
	HYD SYS LO PR B/G/Y
FLT CTL	SERVO LO PR B/G/Y
	GND SPLR NOT EXTENDED
	FLAPS VANE JAM RETRACT/EXTEND
	KRUGER NOT RETRACTED/NOT EXTENDED
ELEC	AC BUS 2 OFF
ATS	ATS OFF (one TCC)
ANTI ICE	STBY STAT HEAT FAULT
NAV ADC	EFIS SGU3 FAULT
	HDG/ATT DISCREPANCY
	CAPT-F/O ON SAME SOURCE
	RADIO HEIGHT CALL OUT
L/G WHEEL	ANTI SKID FAULT (NORM)
	BRK TEMP HI
	L/G NOT LOCKED UP/DN
	L/G POS DET SYS FAULT SYS1/SYS2
FUEL	AUTO FUEL FEED FAULT CTR/INR TK
	TRIM TK SYS FAULT
LOOP	ENG1(2)/APU LOOP A/B FAULT
	FWD/AFT/BULK COMPT LOOP A/B FAULT
	DISCH AGENT 2

If SDAC available only :

HEADER	ASSOCIATED MESSAGE
DOOR	L(R) FWD/AFT CABIN NOT CLOSED
	EXT AVIONICS NOT CLOSED
	FWD/AFT/BULK CARGO NOT CLOSED

HEADER	ASSOCIATED MESSAGE
	L(R) EMER EXIT NOT CLOSED
	L(R) FWD COMPT NOT CLOSED
	UPPER CARGO NOT CLOSED
	LOWER ACCESS DOOR NOT CLOSED

(2)Warnings requiring FWC1 and FWC2 acquisition
(i.e not processed when failure of any FWC)

APU FAULT EMER/SHUT DN
APU FLAP FAULT
ADC 1 + 2 FAULT
ILS 1 + 2 FAULT
RA 1 + 2 FAULT
SPOILER RA OUTPUT
FLAPS (SLATS) SYS 1 + 2 FAULT
FLAPS (SLATS) STUCK
PITCH FEEL 1 + 2 FAULT
PITCH FEEL IN HI SPEED
RUD TRV 1 + 2 FAULT
RUD TRV IN HI SPD
PITCH TRIM 1 + 2 OFF
YAW DAMPER 1 + 2 OFF
ATS 1 + 2 FAULT (DUAL TCC)
L/G LEVER INTERLOCKED
L/G RETRACTION FAULT
L/G DOORS NOT CLOSED
L/G DOORS SYS FAULT
CTR TK L+R PUMP FAULT
TRIM TK PUMP 1 + 2 LO PR
L + R OUTR TK LO LEVEL
PACK 1 + 2 FAULT
CAB PRESS REG 1 + 2 FAULT
YELLOW RUD SERVO JAM
YELLOW L ELEV SERVO JAM
YELLOW L AIL SERVO JAM
GREEN RUD SERVO JAM
GREEN L ELEV SERVO JAM
GREEN L AIL SERVO JAM
BLUE R ELEV SERVO JAM
BLUE R AIL SERVO JAM

(3)Warning acquired by only one FWC
(i.e processed and leading to an indication on CRT (Ref. Fig. 013)
when corresponding FWC is available.
* Title on CRT when only one computer is operating

FWC1		FWC2	
HEADER	ASSOCIATED MESSAGE	HEADER	ASSOCIATED MESSAGE
* ENG1	N1, N2, EGT OVER LIMIT	ENG 2	N1, N2, EGT OVER LIMIT
	OIL HI PR		OIL HI PR
	OIL FILTER CLOG		OIL FILTER CLOG
	REVERSE UNLOCKED		REVERSE UNLOCKED
	FUEL FILTER CLOG		FUEL FILTER CLOG
ENG1(2)	FUEL HEATER FAULT	ENG1(2)	FUEL HEATER FAULT (VALVE
			DISAGREE)
HYD	BLUE RSVR LO AIR PR	HYD	YELLOW RSVR LO AIR PR
	GREEN RSVR LO AIR PR		YELLOW RSVR LO LVL
	BLUE RSVR LO LVL		GREEN RSVR LO LVL
	GREEN RSVR OVHT		YELLOW RSVR OVHT
	BLUE RSVR OVHT		GREEN ELEC PUMPS LO PR
ELEC	IDG1 OIL LO PR	ELEC	GEN LOAD HI
	IDG1 OIL OVHT		IDG2 OIL LO PR
	GEN 1 FAULT		IDG2 OIL OVHT
	APU GEN FAULT		GEN2 FAULT
	AC ESS BUS OFF		
	AC EMER BUS OFF		DC ESS BUS ON BAT
	AC BUS 1 OFF		BAT 2 OVHT
	BAT 1 OVHT		DC NORM BUS OFF
	BAT 3 OVHT		
APU	APU FAULT : AUTO SHUT DN		
	FUEL LO PR		
NAV ADC	ADC 1 FAULT	NAV ADC	ADC2 FAULT
	IRS 1 FAULT		IRS2 FAULT
	IRS 3 FAULT		ILS1 FAULT
	ILS 2 FAULT		RA2 FAULT
	RA 1 FAULT		F/O ALTI FAULT
	CAPT ALTI FAULT		F/O VSI FAULT
	CAPT VSI FAULT		
FLT CTL	BLUE RUD SERVO JAM	FLT CTL	YELLOW STAB SERVO JAM
	BLUE L AIL SERVO JAM		YELLOW R AIL SERVO JAM
	BLUE L ELEV SERVO JAM		YELLOW R ELEV SERVO JAM
	FLAPS (SLATS) SYS1 FAULT		GREEN STAB SERVO JAM
	PITCH FEEL 1 FAULT		GREEN R AIL SERVO JAM
	RUDDER TRV 1 FAULT		GREEN R ELEV SERVO JAM

FWC1		FWC2	
HEADER	ASSOCIATED MESSAGE	HEADER	ASSOCIATED MESSAGE
	SPLR 7/6/3 + 2/FAULT		FLAPS (SLATS) SYS2 FAULT
	PITCH TRIM 1 OFF		PITCH FEEL 2 FAULT
	YAW DAMPER 1 OFF		RUDDER TRV 2 FAULT
			SPLR 5/4 + 1 FAULT
			PITCH TRIM 2 OFF
			YAW DAMPER 2 OFF
ATS	ATS 1 OFF (DUAL TCC)	ATS	ATS 2 OFF (Dual TCC)
L/G WHEEL	ANTI SKID FAULT (ALTN)	L/G WHEEL	ANTI SKID OFF
	AUTO BRK FAULT		TIRE LO PRESS
FUEL	CTR TK EMPTY	FUEL	CTR TK R PUMP FAULT
	CTR TK L PUMP FAULT		
	L INR TK PUMP 1 FAULT		R INR TK PUMP 1 FAULT
	L INR TK PUMP (2) FAULT		R INR TK PUMP (2) FAULT
	L INR TK PUMP (1+2) FAULT		R INR TK PUMP (1+2) FAULT
	L INR TK EMPTY		R INR TK EMPTY
	L OUTR TK PUMP 1 FAULT		R OUTR TK PUMP 1 FAULT
	L OUTR TK PUMP (2) FAULT		R OUTR TK PUMP (2) FAULT
	L OUTR TK PUMP (1+2)		R OUTR TK PUMP (1+2)
	FAULT		FAULT
	L TK LO LVL		R TK LO LVL
	TRIM TK PUMP 1 LO PR		TRIM TK PUMP 2 LO PR
	ZFW OR ZFCG DISAGREE		TRIM TK EMPTY
			TRIM TK SYS FAULT (TT
			EMPTY)
			CGCC ALTERNATE MODE
AIR BLEED	ENG1 HP VALVE FAULT	AIR BLEED	ENG2 HP VALVE FAULT
	ENG1 HP VALVE STUCK		ENG2 HP VALVE STUCK OPEN
	OPEN		BLEED VALVE 2 FAULT
	BLEED VALVE 1 FAULT		BLEED 2 LEAK
	BLEED 1 LEAK		
	APU BLEED LEAK		
	AIR X FEED FAULT		
ANTI ICE	ICE DETECTED	ANTI ICE	ICE DET OVHT
	ENG1 NAC VALVE NOT CLOSED		ENG 2 NAC VALVE NOT CLOSED
	ENG1 NAC VALVE NOT OPEN		ENG 2 NAC VALVE NOT OPEN
	L WING VALVE NOT CLOSED		R WING VALVE NOT CLOSED
	L WING VALVE NOT OPEN		R WING VALVE NOT OPEN
			F/O PITOT OVHT
			F/O PITOT HEAT OFF
			F/O PROBES HEAT OFF
	CAPT PITOT OVERHEAT		
	CAPT PROBES HEAT OFF		

FWC1		FWC2	
HEADER	ASSOCIATED MESSAGE	HEADER	ASSOCIATED MESSAGE
	CAPT ALPHA HEAT FAULT		F/O ALPHA HEAT FAULT
	CAPT TAT HEAT FAULT		F/O TAT HEAT FAULT
	CAPT STAT HEAT FAULT		F/O STAT HEAT FAULT
	CAPT PITOT HEAT FAULT		F/O PROBES HEAT FAULT
	ENG1 EPR HEAT FAULT		ENG2 EPR HEAT FAULT
	STBY PITOT HEAT FAULT		STBY ALPHA HEAT FAULT
	STBY PITOT OVERHEAT		R WINDOW HEAT FAULT
	STBY PROBES HEAT OFF		
	L WINDOW HEAT FAULT		
AIR	PACK 1 FAULT	AIR	PACK 2 FAULT
	MID CAB HOT AIR OVHT		FWD CAB HOT AIR OVHT
	CKPT HOT AIR OVHT		AFT CAB HOT AIR OVHT
	BULK CARGO HOT AIR OVHT		FWD CARGO HOT AIR OVHT
	VENT OVBD VALVE FAULT		VENT EXTRACT LO FLOW
			BULK CARGO ISOL VALVE
			FAULT
	VENT BLOWERS LO FLOW		BULK CARGO COOL VALVE
	FWD CARGO ISOL VALVE		FAULT
	FAULT		
	GND COOL VALVE OPEN		
	FWD CARGO COOL VALVE		
	FAULT		
CABIN PRESS	OUTFLOW VALVE 1 FAULT	CABIN PRESS	OUTFLOW VALVE 2 FAULT
	CAB PRESS REG 1 FAULT		CAB PRESS REG 2 FAULT
			CAB PRESS LO ΔP
	MAN PRESS VALVE NOT		
	CLOSED		
	MAN PRESS VALVE NOT OPEN		
DOOR	FWD CARGO SW FAULT	DOOR	AFT CARGO SW FAULT
	NOTE : If SDAC FAIL only		NOTE : If SDAC FAIL only
	EXT AVIONICS NOT CLOSED		
	L FWD CABIN NOT CLOSED		R FWD CABIN NOT CLOSED
	L AFT CABIN NOT CLOSED		R AFT CABIN NOT CLOSED
	FWD CARGO NOT CLOSED		AFT CARGO NOT CLOSED
			BULK CARGO NOT CLOSED
	L FWD COMPT NOT CLOSED		R FWD COMPT NOT CLOSED
	L EMER EXIT NOT CLOSED		R EMER EXIT NOT CLOSED
			LOWER ACCESS DOOR NOT
			CLOSED

J. ECAM Control Panel
(Ref. Fig. 007)
The ECAM control panel includes all the controls required for operation of the ECAM system.
It consists of :
(1) Two control switches which enable each ECAM display unit to be switched on and the brightness of the images to be adjusted.
(2) Two ECAM SGU P/B switches for control and indication of the symbol generator units 1 and 2. These P/B switches are normally pushed in with legends off. In the event of SGU failure, FAULT legend comes on. The P/B switch has to be released to switch off the faulty SGU. The OFF legend comes on.
(3) Twelve system P/B switches which allow the manual selection of system synoptic diagram display. When a system is selected P/B switch light comes on. The P/B switches are provided with integral lighting enabling selection by night.
(4) Three control P/B switches :
(a) CLR P/B switch which enables (clear function) by pressing it when CLR LT is on
- to clear the warnings chapter by chapter and the associated MASTER lights when all warnings are cleared.
- to transit to the second part of the message when there is an overflow on CRT.
- to transit from one page to another (Ref. para K).

(b) RCL P/B switch which enables (recall function) by pressing it suppression of a warning inhibition due to the CLEAR function or the flight phase.
- Action on RCL P/B switch, for more than 3s, resets the Emergency cancel function ; so all previous cancellations disappear. Moreover when a warning is inhibited by flight phase, action on RCL P/B switch illuminates the MASTER lights associated with this warning if this warning has not been cleared.

(c) STS P/B switch which enables the aircraft status page (Ref. para K (1)) to be called manually. No status function during flight phases 1 and 12.

K. L ECAM Display Unit

(1)Normal Display

In normal operation (without display unit failure), the L ECAM display unit presents one of the following messages.

(a)Warning (logic processed by the FWCs) - Page 1 and 2.

- presentation of an independent failure or primary failure : (according to the priority) only on page 1 of L ECAM display unit
- presentation of secondary failure : (according to the priority) only on page 2 of L ECAM display unit

(b)Status (logic processed by the FWCs) - STATUS page.

- an operational summary of the aircraft condition,
- an explanation of possible autoland capability downgrading,
- indications, as far as possible, of the aircraft status following all failures except those that do not affect the flight,
- general contents and organization :
  . emergency procedures (LAND ASAP, ...),
  . landing capability,
  . limitations (speed, altitude ...),
  . postponable procedures displayed or not on first page,
  . systems/functions lost,
  . information.

(c)Memo (logic processed by the SGU) - MEMO page

Reminder of functions/systems which are temporarily used.

NOTE : . In case of L ECAM display unit failure : (a), (b) and (c) can be displayed on the R ECAM display unit (Ref. Para. 7. E).
. In case of failure of one FWC, the processed status are displayed.

(2)Messages presentation (logic processed by the SGU)

(a)General

- Wording and abbreviations are consistent with the overhead panel ;
- All secondary failures are listed following normal overhead panel scanning :
  i.e. from the left to the right and from the lower section to the upper section for each column of the overhead panel.
- The action OFF or OFFR always written in accordance with the overhead panel.

(b)Warning messages
R (Ref. Fig. 017)
R (c)STATUS messages
R e.g. : dual G + Y hydraulic
R system low pressure :
R (Ref. Fig. 018)
R (d)MEMO messages
R (Ref. Fig. 019)

The complete list of MEMO items is :
- CAB PRESS MAN CTL
- IRS IN ALIGN

**ON A/C 001-004, 006-100,

- TAT IN ICING RANGE

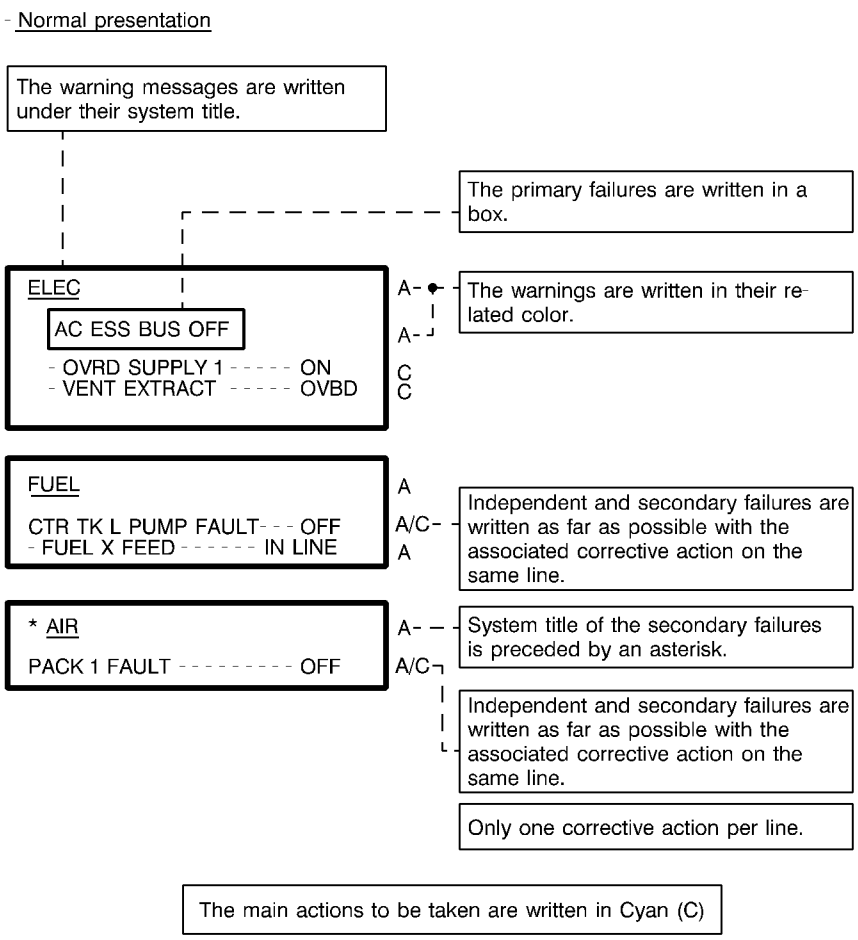
**ON A/C 005-005,

- TAT IN FREQUENT ICING RANGE

**ON A/C 001-100,

- ENG ANTI ICE ON
- WING ANTI ICE ON
- APU RUNNING
- CONTINUOUS RELIGHT ON
- SEAT BELTS ON
- NO SMOKING ON
- FUEL FEED MAN CTL
- CTR TANK FEEDING
- FUEL X FEED
- PARKING BRAKE ON
- EXT PWR CONNECTED
- SPEED BRAKES EXTENDED (Pulsing if THROTTLES NOT AT IDLE)
- LDG LIGHT EXTENDED
- ECON FLOW SELECTED
- MAX COOL ON

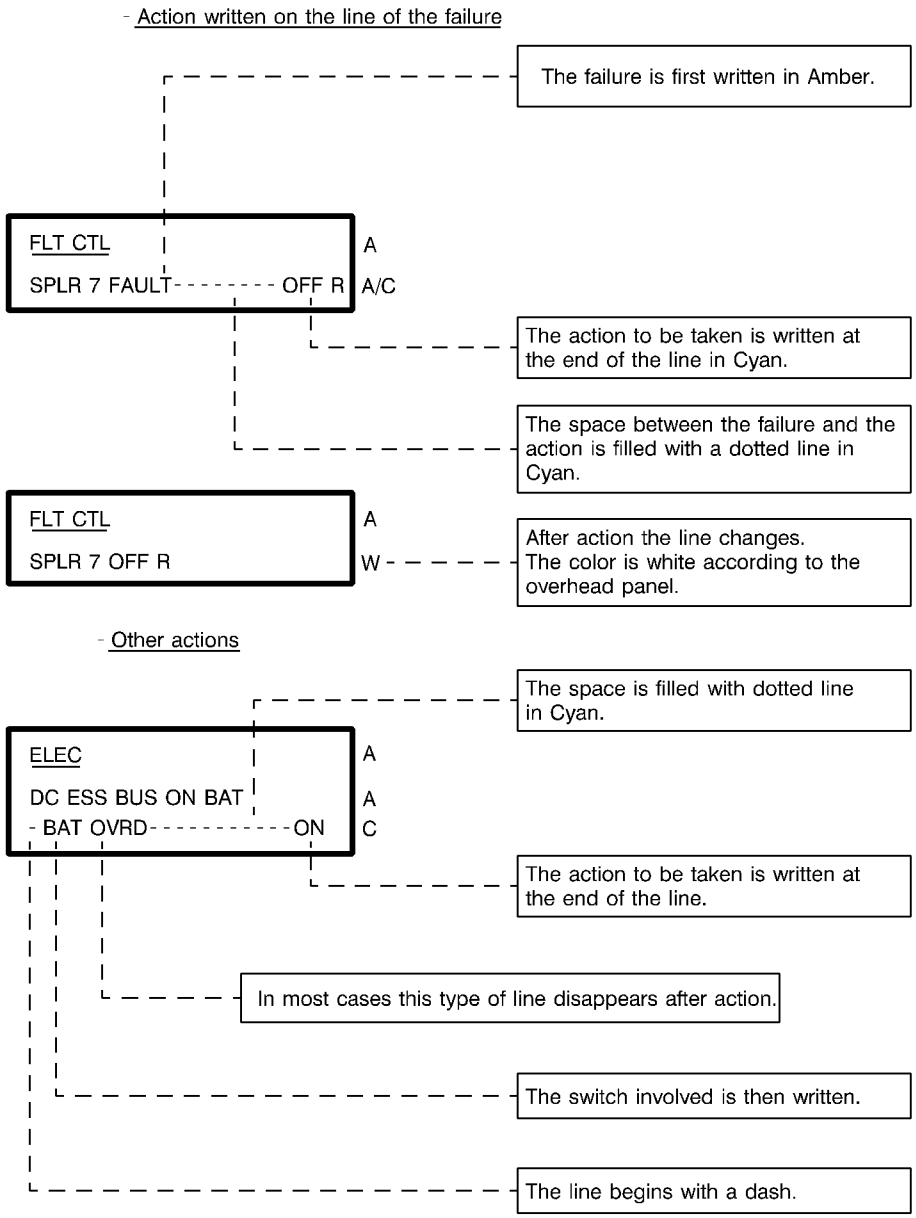
R
R TAT, CG, FUEL TK TEMP, GW and T.Fuel information displayed at the
R bottom of the page. (Ref. Fig. 020)


- Normal presentation
The warning messages are written under their system title.
The primary failures are written in a box.
ELEC
AC ESS BUS OFF
- OVRD SUPPLY 1 ----- ON
- VENT EXTRACT ----- OVBD
A-
A-
C
C
The warnings are written in their related color.
FUEL
CTR TK L PUMP FAULT--- OFF
- FUEL X FEED------ IN LINE
A
A/C-
A
Independent and secondary failures are written as far as possible with the associated corrective action on the same line.
* AIR
PACK 1 FAULT --------- OFF
A- —
A/C
System title of the secondary failures is preceded by an asterisk.
Independent and secondary failures are written as far as possible with the associated corrective action on the same line.
Only one corrective action per line.
The main actions to be taken are written in Cyan (C)

BM5 31 51 00 0 DAAA 00

Warning Messages (Sheet 1)
Figure 017

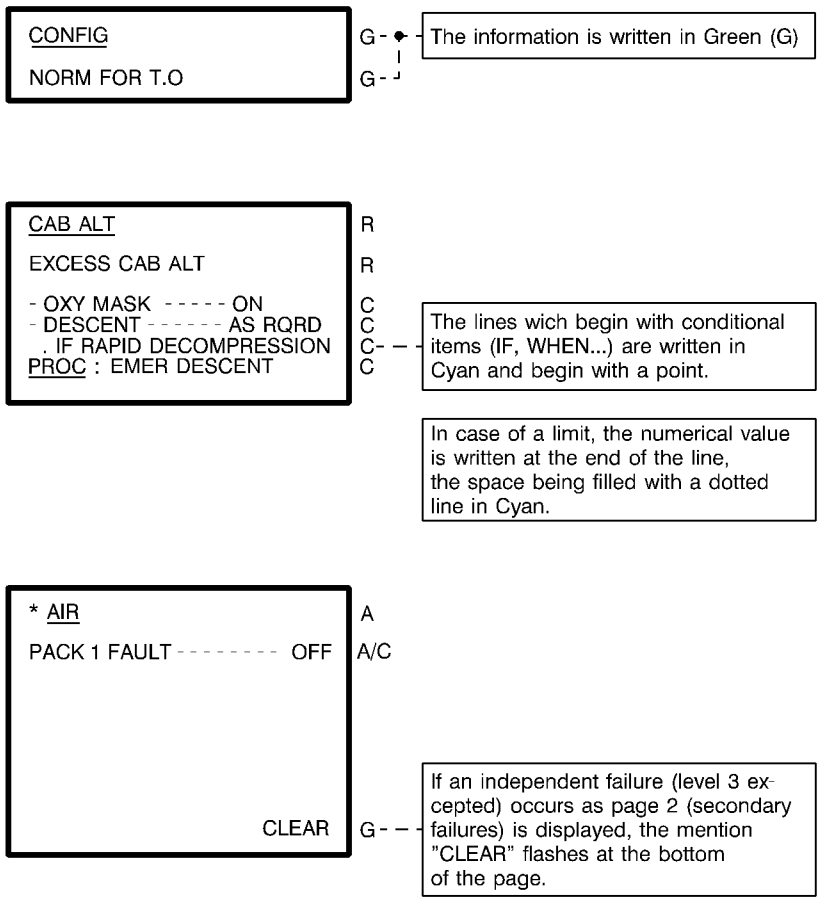
R


- Action written on the line of the failure
The failure is first written in Amber.
FLT CTL
SPLR 7 FAULT
OFF R
A
A/C
The action to be taken is written at the end of the line in Cyan.
The space between the failure and the action is filled with a dotted line in Cyan.
FLT CTL
SPLR 7 OFF R
A
W
After action the line changes. The color is white according to the overhead panel.
- Other actions
The space is filled with dotted line in Cyan.
ELEC
DC ESS BUS ON BAT
- BAT OVRD
ON
A
A
C
The action to be taken is written at the end of the line.
In most cases this type of line disappears after action.
The switch involved is then written.
The line begins with a dash.

BM5 31 51 00 0 DAAJ 00

Warning Messages (Sheet 2)
Figure 017

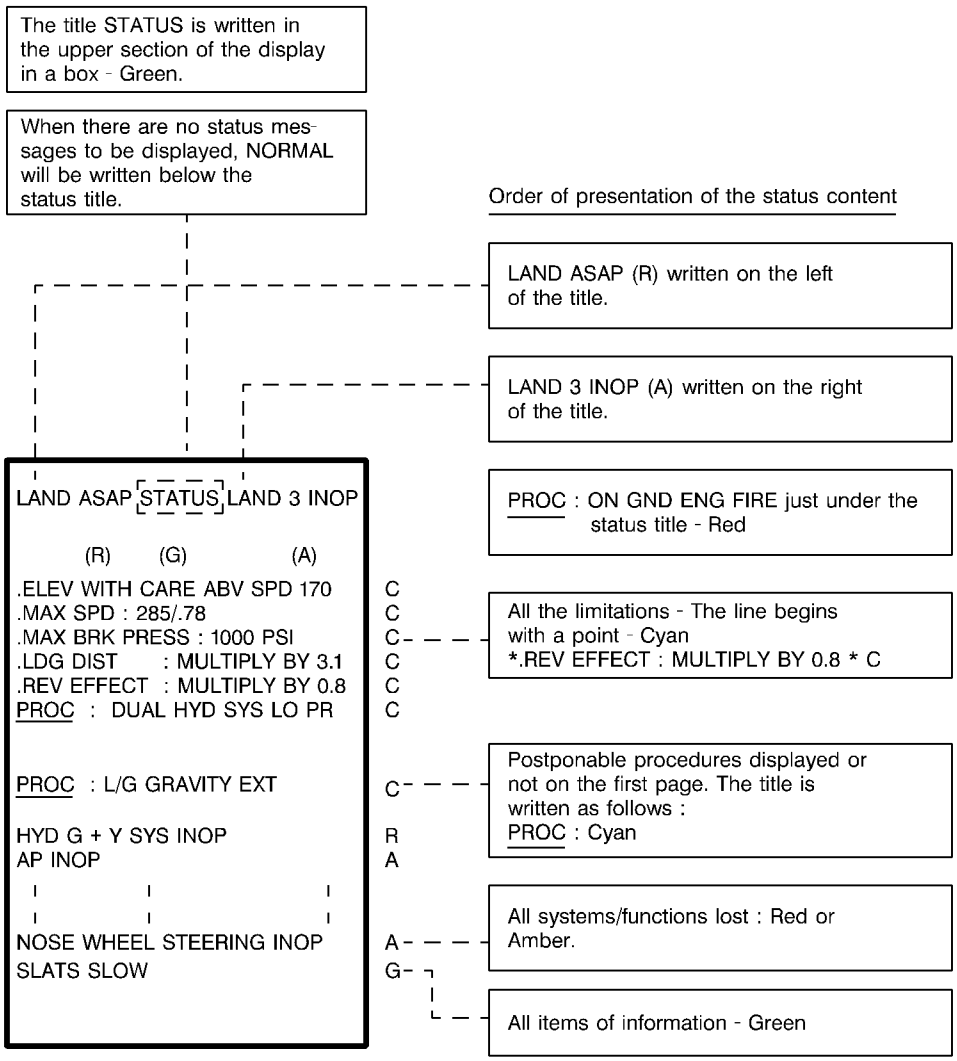
R


CONFIG
NORM FOR T.O
G
G
The information is written in Green (G)
CAB ALT
EXCESS CAB ALT
- OXY MASK ----- ON
- DESCENT ------ AS RQRD
. IF RAPID DECOMPRESSION
PROC : EMER DESCENT
R
R
C
C
C
C
The lines wich begin with conditional items (IF, WHEN...) are written in Cyan and begin with a point.
In case of a limit, the numerical value is written at the end of the line, the space being filled with a dotted line in Cyan.
* AIR
PACK 1 FAULT -------- OFF
CLEAR
A
A/C
G
If an independent failure (level 3 excepted) occurs as page 2 (secondary failures) is displayed, the mention "CLEAR" flashes at the bottom of the page.

BM5 31 51 00 0 DAAS 00

Warning Messages (Sheet 3)
Figure 017

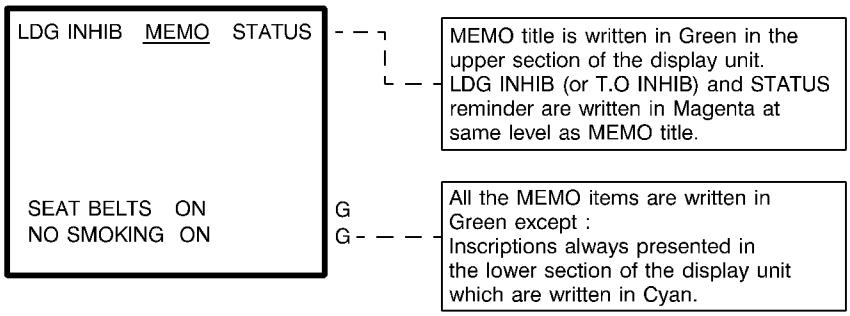
R


The title STATUS is written in the upper section of the display in a box - Green.
When there are no status messages to be displayed, NORMAL will be written below the status title.
Order of presentation of the status content
LAND ASAP (R) written on the left of the title.
LAND 3 INOP (A) written on the right of the title.
PROC : ON GND ENG FIRE just under the status title - Red
All the limitations - The line begins with a point - Cyan
*.REV EFFECT : MULTIPLY BY 0.8 * C
Postponable procedures displayed or not on the first page. The title is written as follows :
PROC : Cyan
All systems/functions lost : Red or Amber.
All items of information - Green
LAND ASAP STATUS LAND 3 INOP
(R) (G) (A)
.ELEV WITH CARE ABV SPD 170 C
.MAX SPD : 285/.78 C
.MAX BRK PRESS : 1000 PSI C
.LDG DIST : MULTIPLY BY 3.1 C
.REV EFFECT : MULTIPLY BY 0.8 C
PROC : DUAL HYD SYS LO PR C
PROC : L/G GRAVITY EXT C
HYD G + Y SYS INOP R
AP INOP A
NOSE WHEEL STEERING INOP A
SLATS SLOW G

BM5 31 51 00 0 DBA0 00

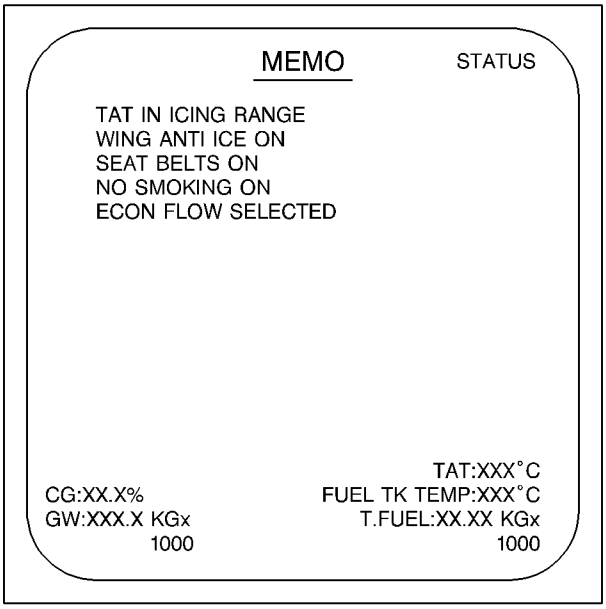
STATUS Messages
Figure 018

R


LDG INHIB MEMO STATUS
SEAT BELTS ON
NO SMOKING ON
G
G
MEMO title is written in Green in the upper section of the display unit.
LDG INHIB (or T.O INHIB) and STATUS reminder are written in Magenta at same level as MEMO title.
All the MEMO items are written in Green except :
Inscriptions always presented in the lower section of the display unit which are written in Cyan.

BM5 31 51 00 0 DCE0 00

MEMO Messages
R Figure 019



BM5 31 51 00 0 DDG0 00

MEMO Messages Page
R Figure 020

(3)Messages display operational mode
(a)Automatic mode related to a failure
(Ref. Fig. 021, 022, 023)
(Ref. Fig. 024)
(Ref. Fig. 025)
(Ref. Fig. 026)

**ON A/C 001-004, 006-100,

(Ref. Fig. 027)

**ON A/C 005-005,

(Ref. Fig. 028)

**ON A/C 001-100,

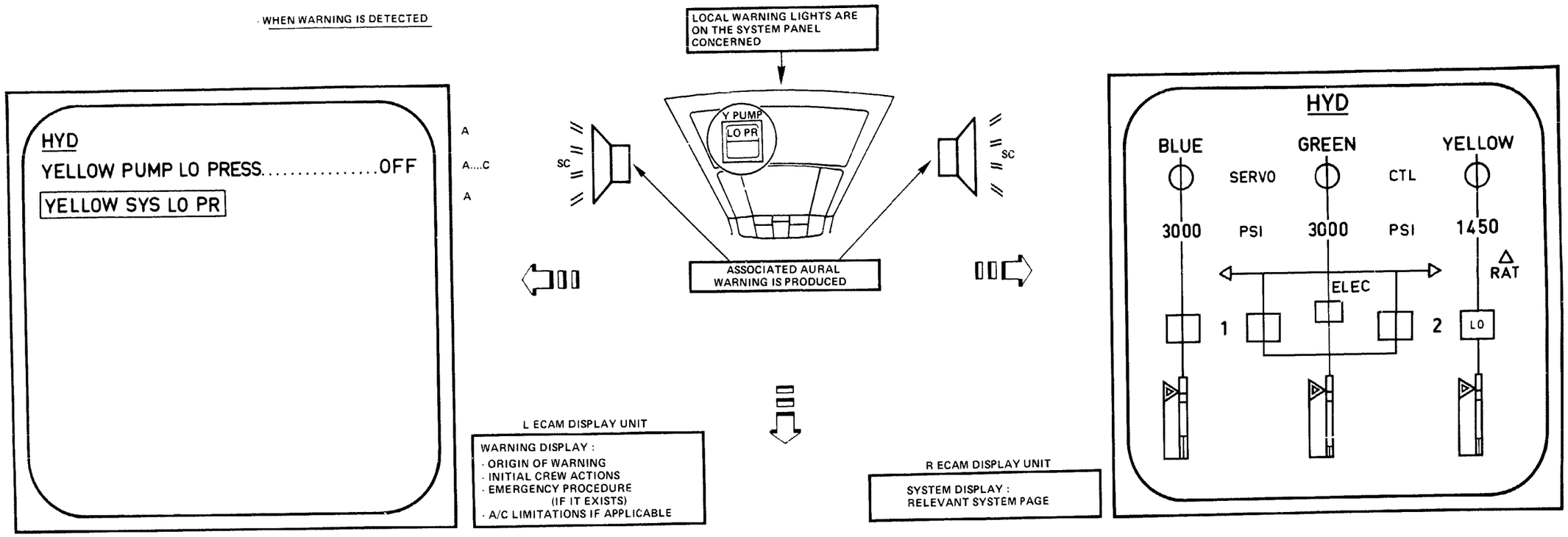
(Ref. Fig. 029)
As soon as a warning is detected by the FWC, the L ECAM display unit automatically shows the first warning page.
In case of primary failure, the crew can manually select the secondary failures which are displayed on the second page by pressing the CLR P/B switch on the ECAM control panel.
The warning message is cleared and STATUS page is displayed automatically during flight (or MEMO if no status message) when the failure disappears or when the CLR P/B switch is pressed again.
(b)STATUS mode
(Ref. Fig. 030, 026)
This mode allows the crew to know the operational status of the aircraft.
The STATUS message gives the list of all the postponable procedures and all the operationally signifiant modifications of the aircraft status.
This mode is selected
- automatically after a warning message, as soon as all corrective actions have been performed, by pressing the CLR P/B switch and in flight only (Phases 6, 7, 8) (If there is no STATUS, MEMO is directly displayed).
- manually, if no warning is displayed by pressing the STS P/B switch. In this case the CLR P/B SW LT comes on. (If there is no STATUS, NORMAL is directly displayed).

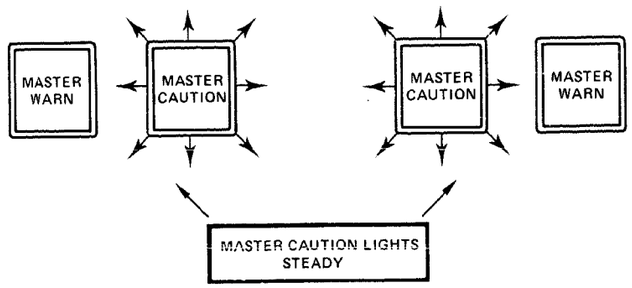
This mode is suppressed automatically when a warning message occurs or manually when the CLR P/B switch is pressed.
(c)MEMO mode

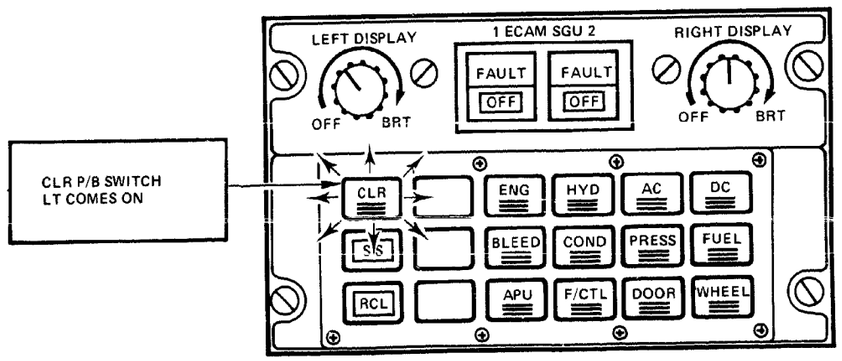
**ON A/C 001-004, 006-100,

(Ref. Fig. 031, 033, 035)
(Ref. Fig. 037, 027)

**ON A/C 005-005,

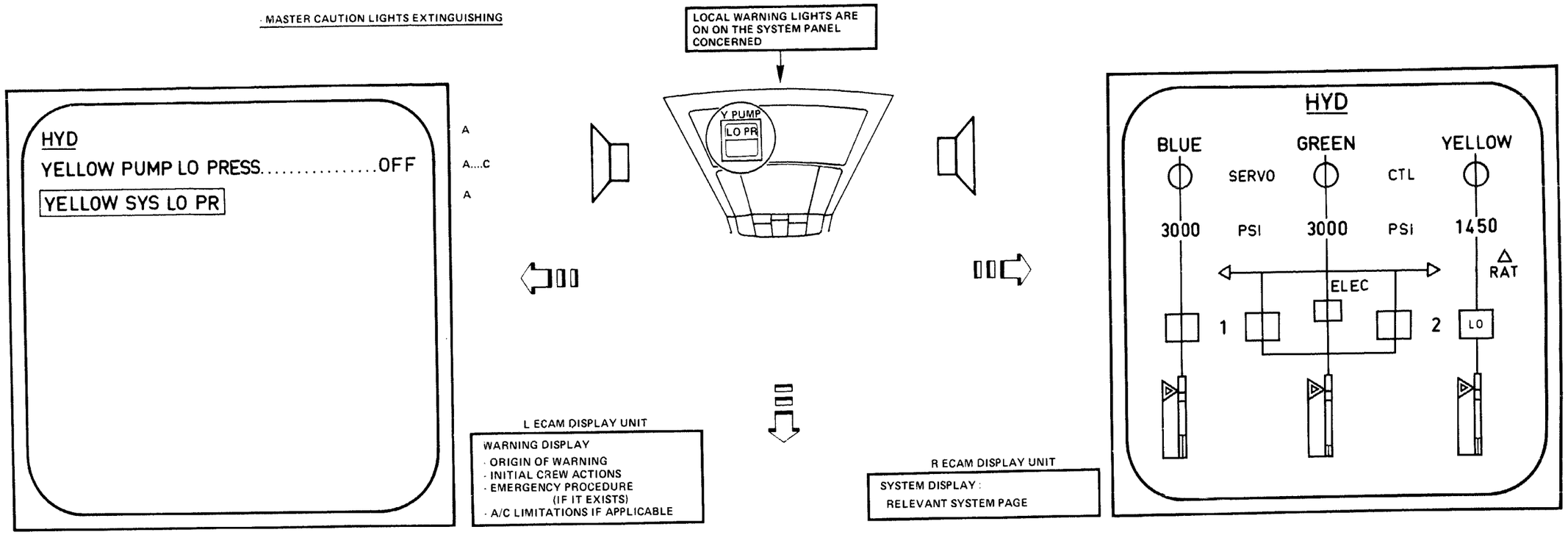


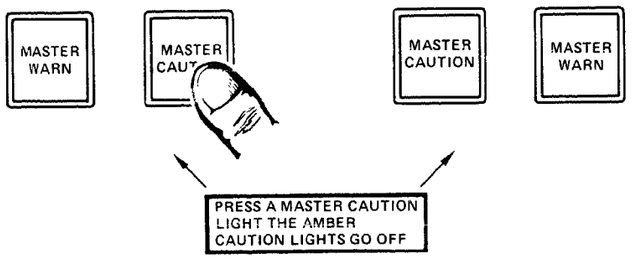


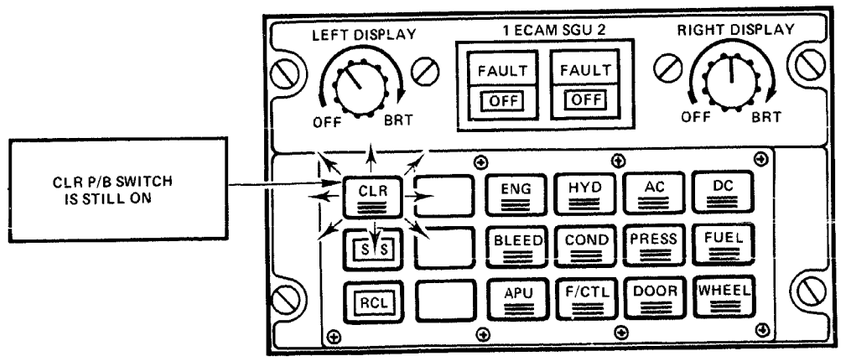


BM5 31 51 00 0 SWVO 14 09
DM5

Operation with a Primary Aircraft System Failure
Whem Warning is Detected
Figure 021

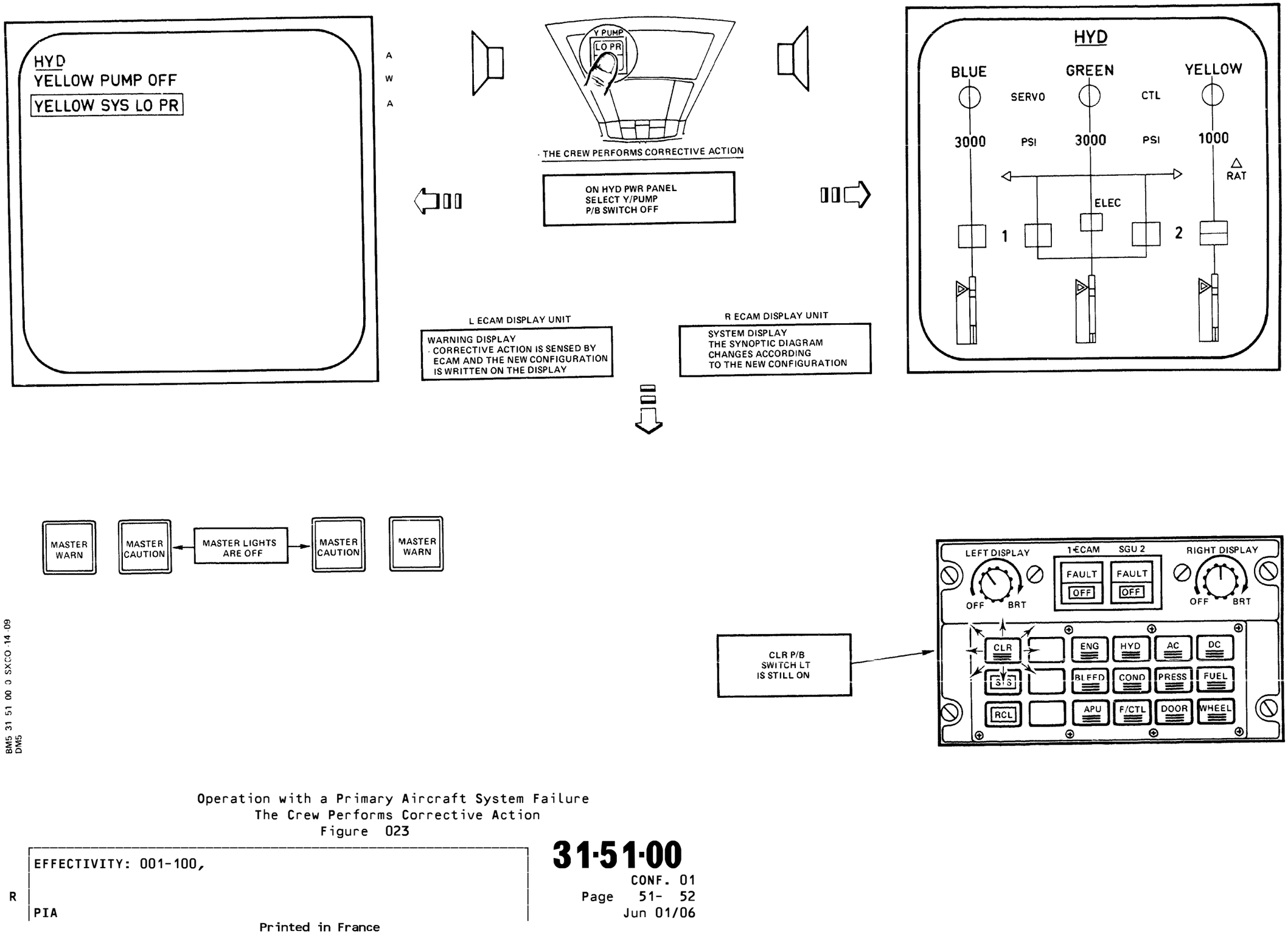






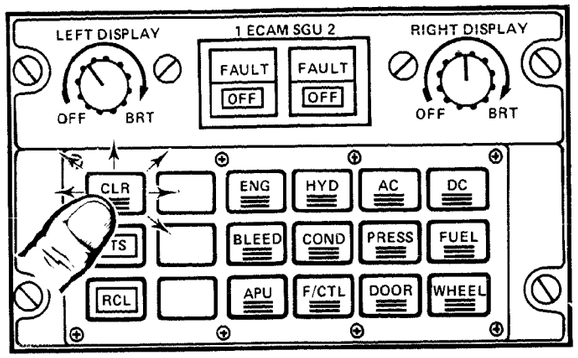
BM5 31 51 00 0 SWZO 14 09
DM5

Operation with a Primary Aircraft System Failure
MASTER CAUTION Lights Extinguishing
Figure 022



BM5 31 51 00 3 SXCO 14 09
DM5

Operation with a Primary Aircraft System Failure
The Crew Performs Corrective Action
Figure 023



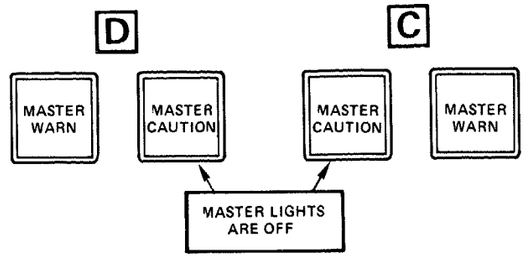
E

PRESS THE CLR P/B SWITCH
CLR LT REMAINS ON

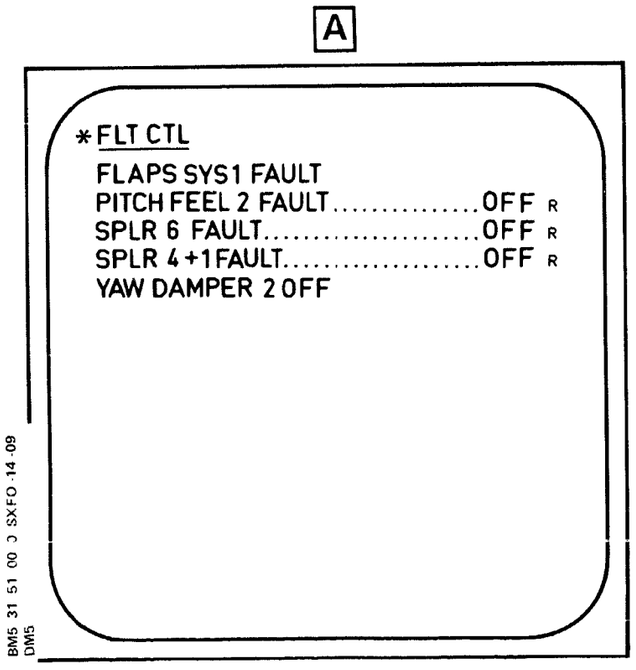
CLEARING
OF THE PRIMARY
FAILURE

D

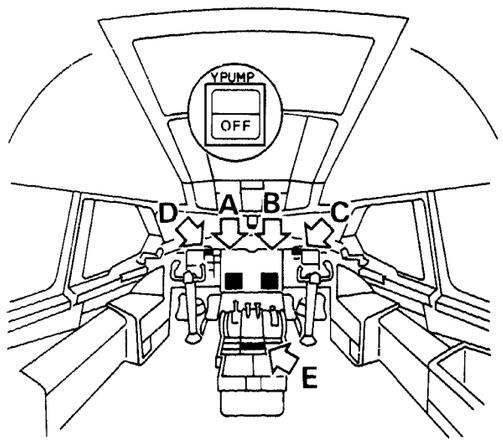
C



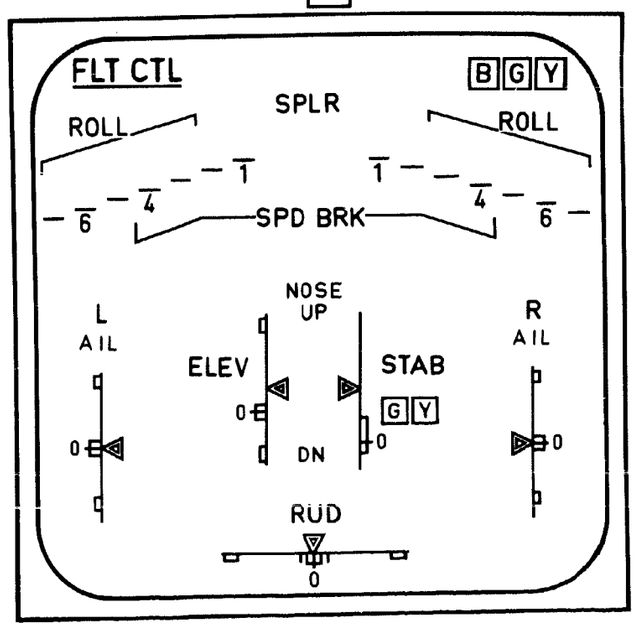
A



A
A
A....C
A....C
A....C
W



B



L ECAM DISPLAY UNIT
WARNING DISPLAY
ALL SECONDARY FAILURES ASSOCIATED WITH CORRECTIVE ACTIONS

R ECAM DISPLAY UNIT
SYSTEM DISPLAY
RELEVANT SYSTEM PAGE

BM5 31 51 00 3 SXFO 14-09
DM5

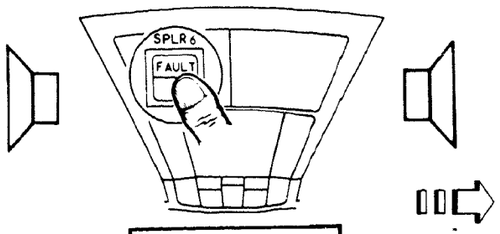
Operation with a Primary Aircraft System Failure
Clearing of the Primary Failure
Figure 024

EFFECTIVITY: 001-100,

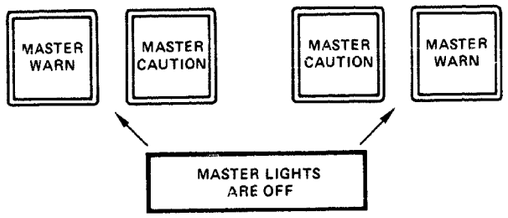
R

PIA

- THE CREW PERFORMS CORRECTIVE ACTIONS

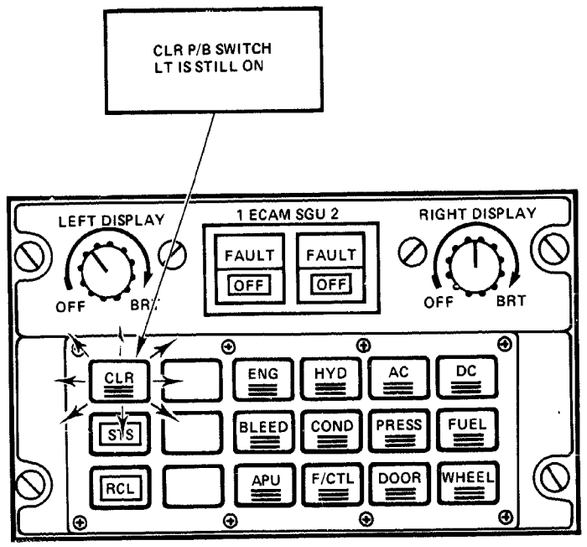


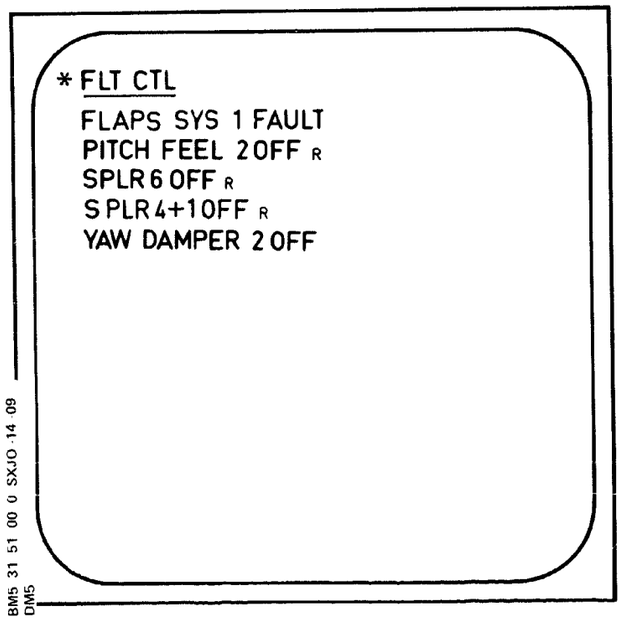
ON THE OVERHEAD PANEL
PRESS THE P/B SWITCHES
WITH FAULT LEGENDS ON



MASTER LIGHTS
ARE OFF

CLR P/B SWITCH
LT IS STILL ON



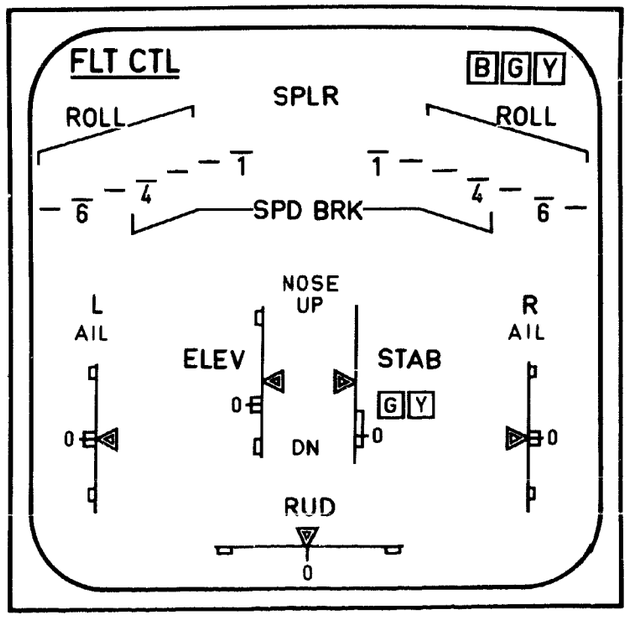


L ECAM DISPLAY UNIT

CORRECTIVE ACTIONS ARE SENSED BY ECAM AND THE NEW CONFIGURATION IS WRITTEN ON THE DISPLAY

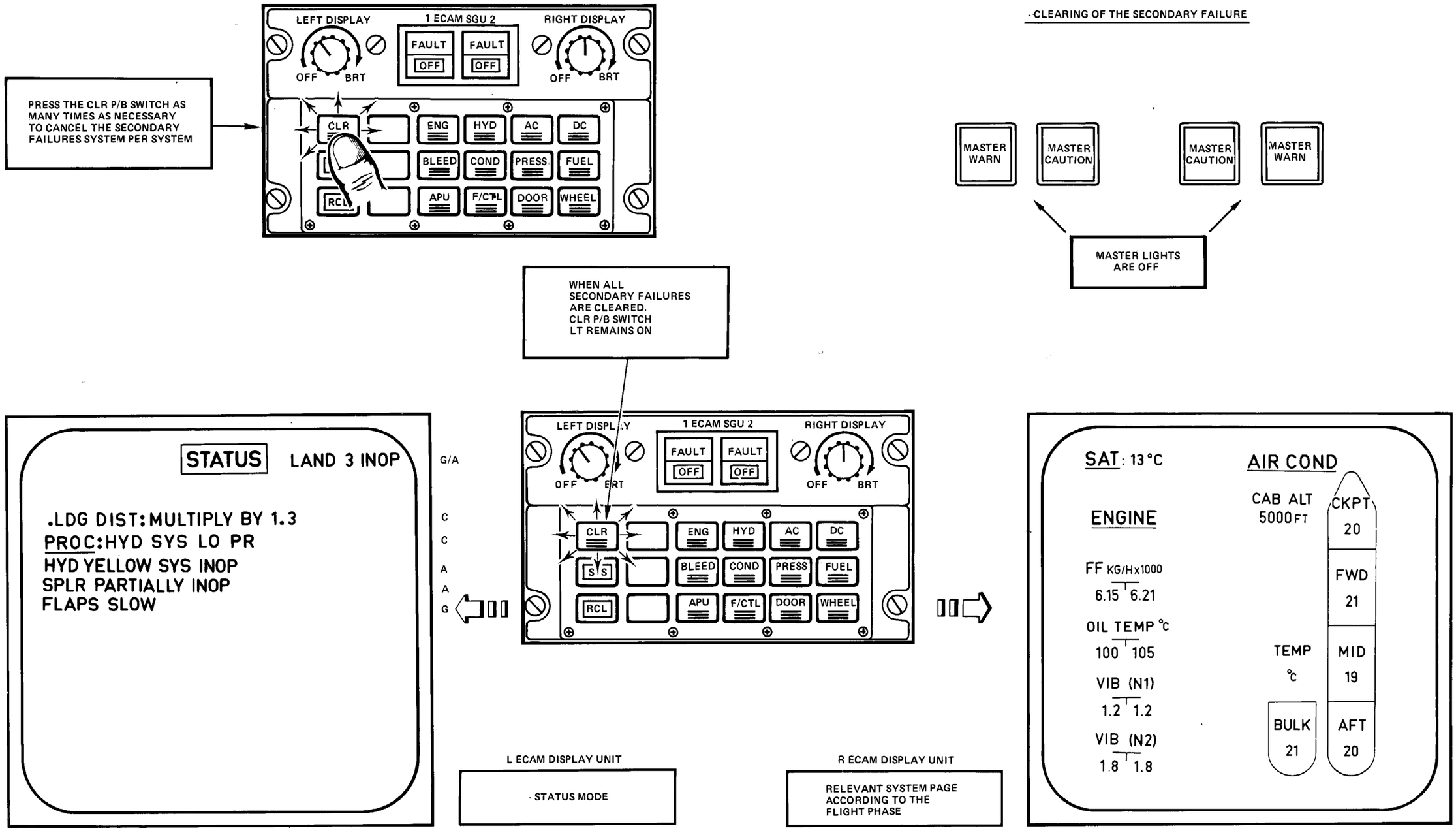
R ECAM DISPLAY UNIT

RELEVANT SYSTEM PAGE



BM5 31 51 00 0 SXJO 14 09
DM5

Operation with a Primary Aircraft System Failure
The Crew Performs Corrective Actions
Figure 025



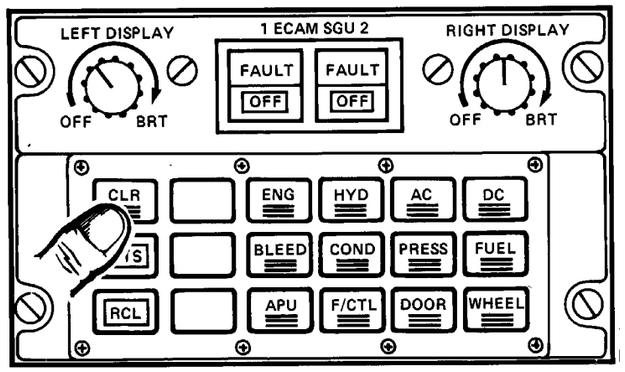
Operation with a Primary Aircraft System Failure
Clearing of the Secondary Failure
Figure 026

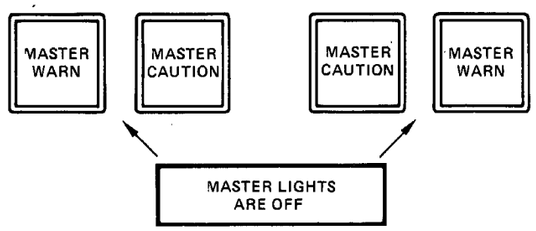
R EFFECTIVITY: 001-100,

PIA

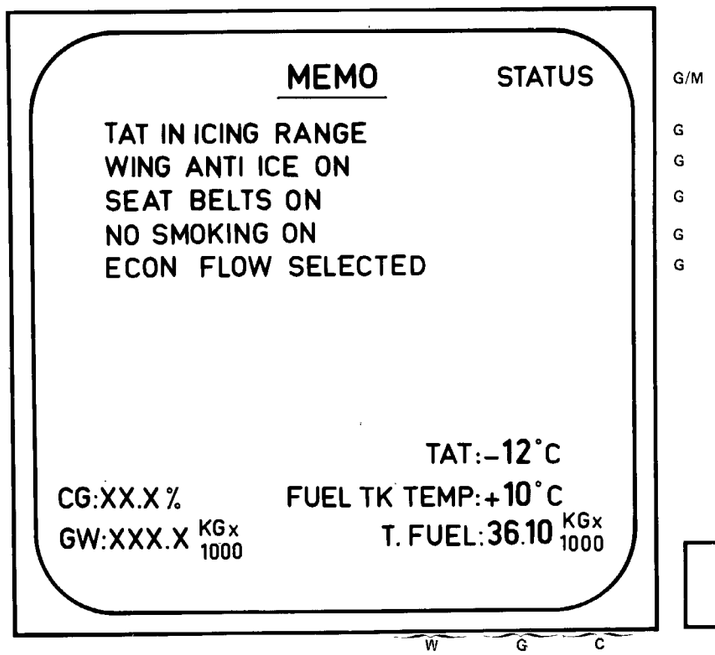
Printed in France

CLEARING OF THE STATUS INFORMATION





PRESS THE CLR P/B SWITCH ONCE MORE
CLR P/B SW LT GOES OFF



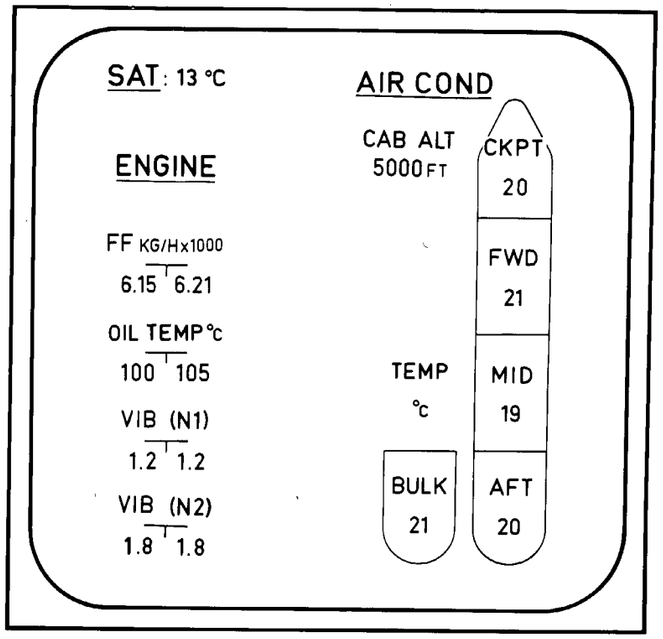
G/M
G
G
G
G
G

L ECAM DISPLAY UNIT

- MEMO MODE

R ECAM DISPLAY UNIT

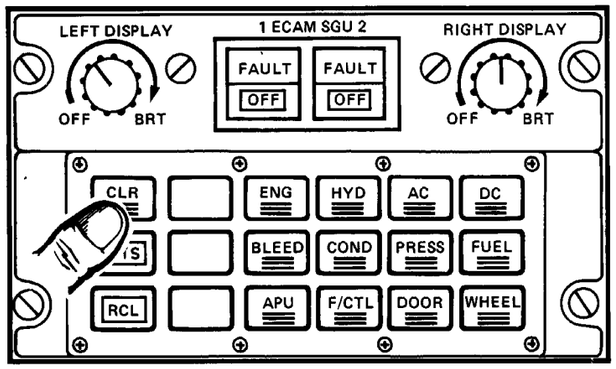
- RELEVANT SYSTEM PAGE ACCORDING TO THE FLIGHT PHASE

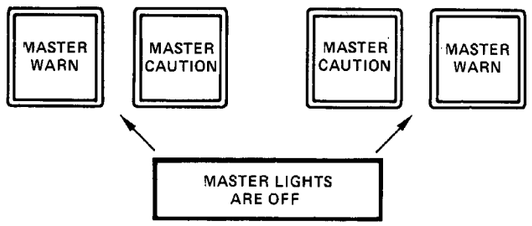


BM5 31 51 00 0 TXR2 28

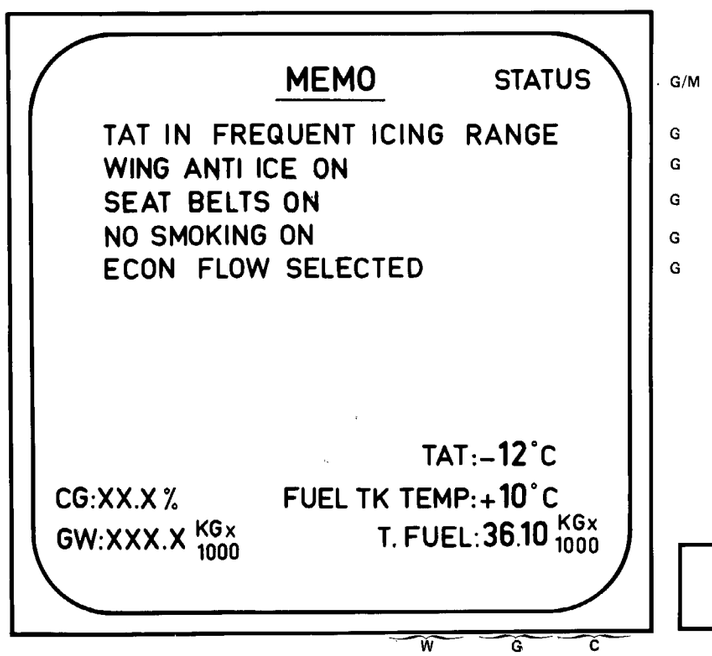
Operation with a Primary Aircraft System Failure
Clearing of the STATUS Information
Figure 027

CLEARING OF THE STATUS INFORMATION





PRESS THE CLR P/B SWITCH ONCE MORE
CLR P/B SW LT GOES OFF

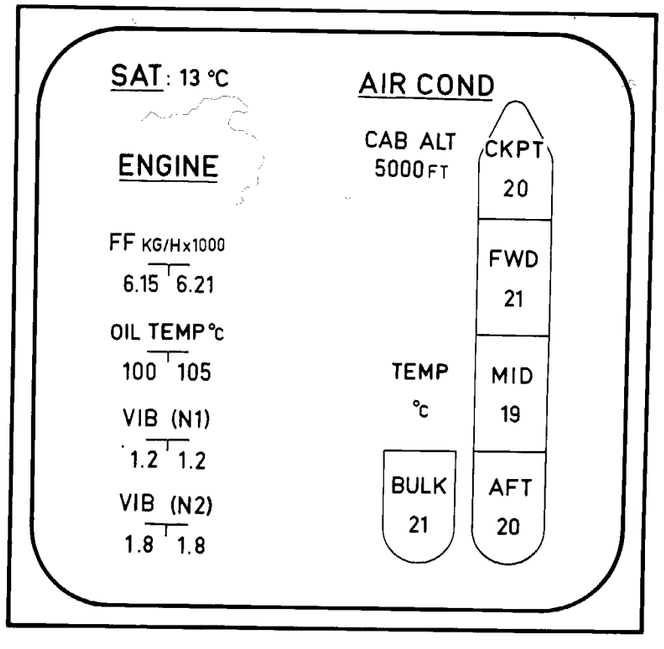


L ECAM DISPLAY UNIT

- MEMO MODE

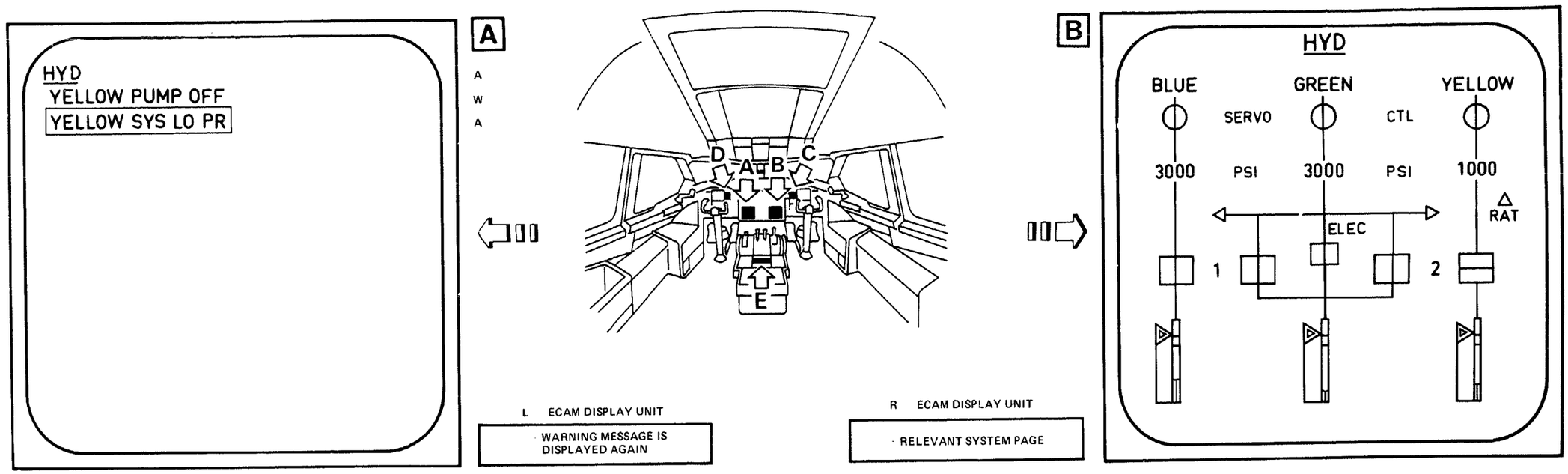
R ECAM DISPLAY UNIT

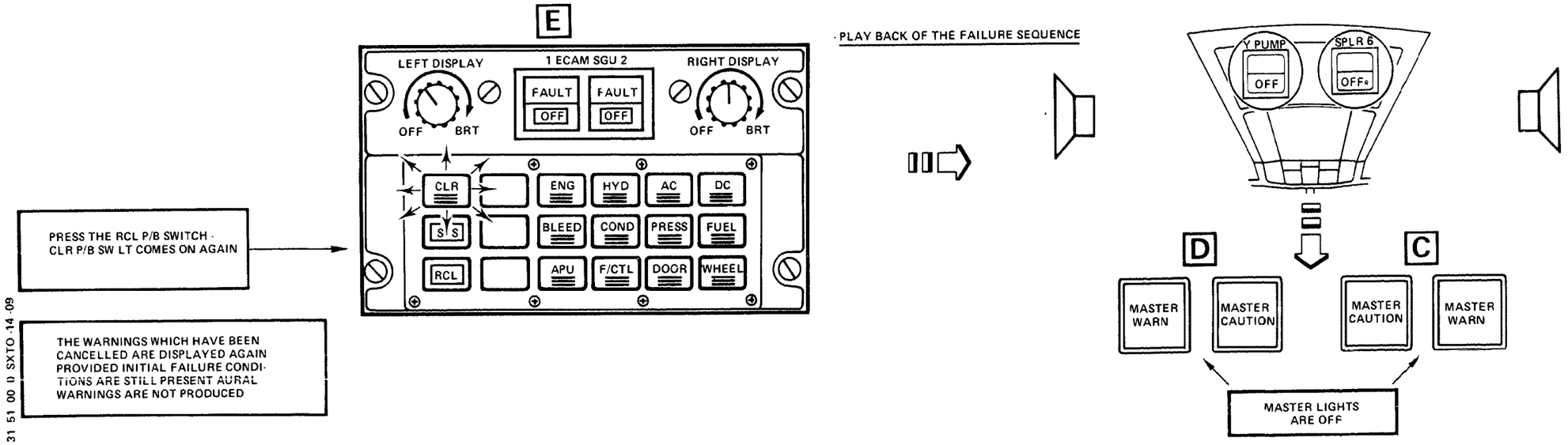
- RELEVANT SYSTEM PAGE ACCORDING TO THE FLIGHT PHASE



BM5 31 51 00 0 TXR3-28

Operation with a Primary Aircraft System Failure
Clearing of the STATUS Information
Figure 028





BM5 31 51 00 01 SXTO 14 09
DM5

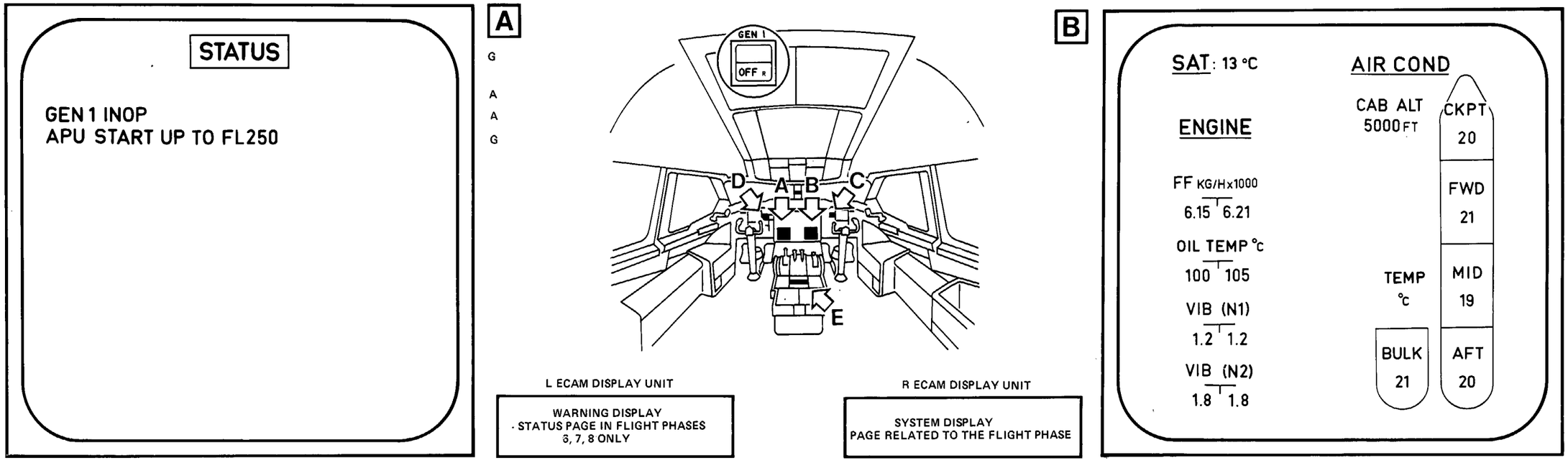
Operation with a Primary Aircraft System Failure
Play Back of the Failure Sequence
Figure 029

EFFECTIVITY: 001-100,

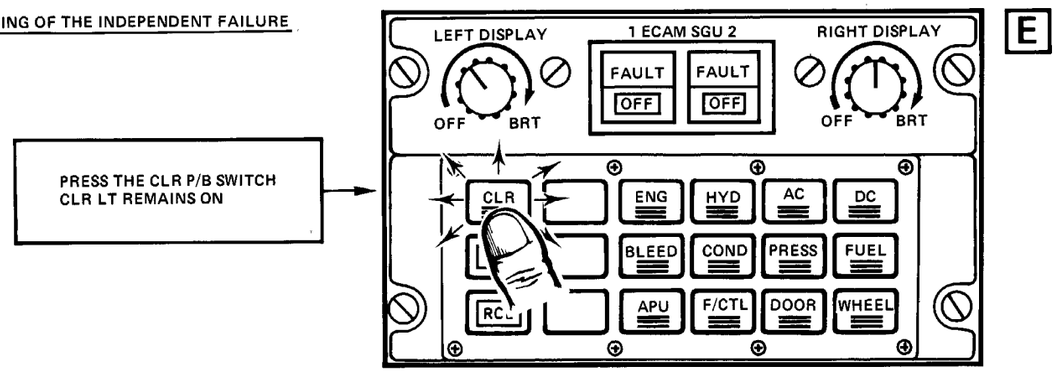
R

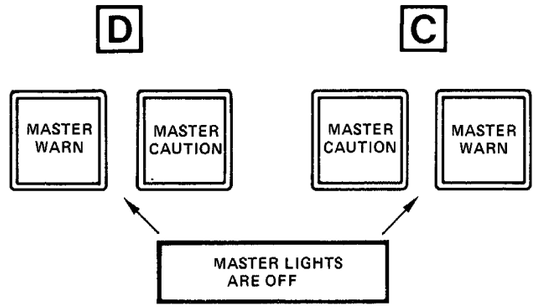
PIA

Printed in France



- CLEARING OF THE INDEPENDENT FAILURE





BM5 31 51 00 0 SWJ2 28

Operation with an Independent Aircraft System Failure
Clearing of the Independent Failure
Figure 030

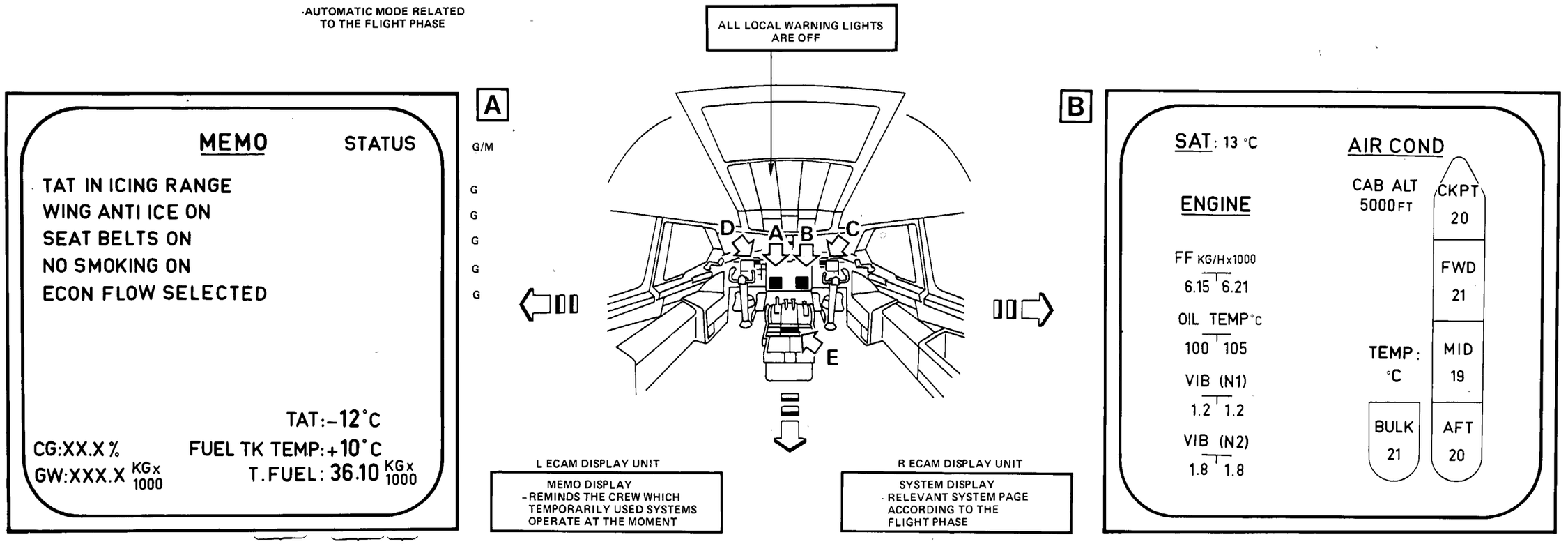
(Ref. Fig. 032, 034, 036)
(Ref. Fig. 038, 028)

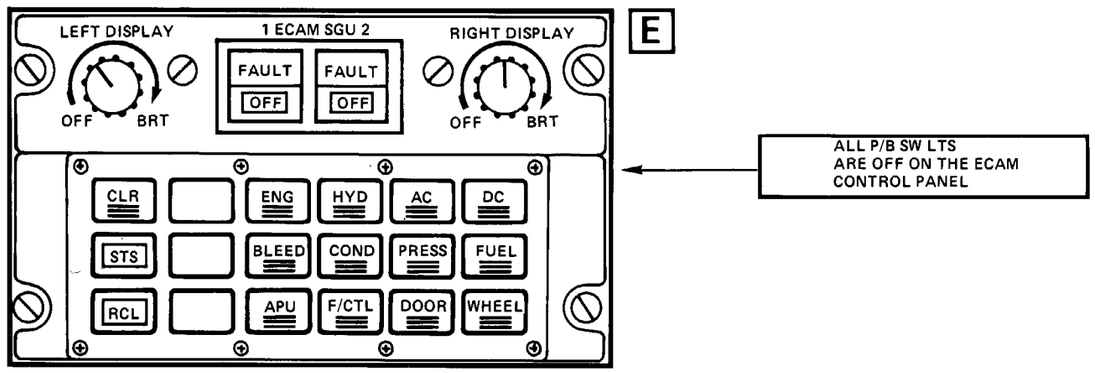
**ON A/C 001-100,

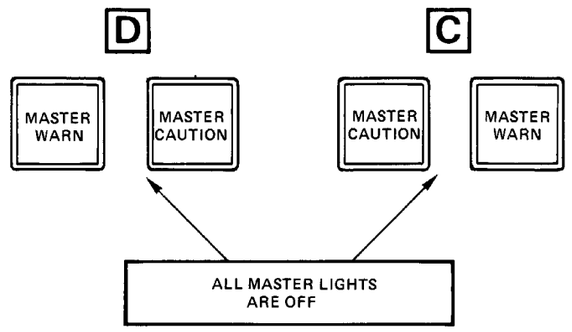
This mode gives the basic page of the L ECAM display unit. It reminds the crew of temporarily used systems or of operating functions.
- This mode is selected automatically when no other mode is engaged
- It can be suppressed manually when the STS or RCL P/B switch is pressed or automatically as soon as another mode is engaged.

INTENTIONALLY BLANK

Printed in France

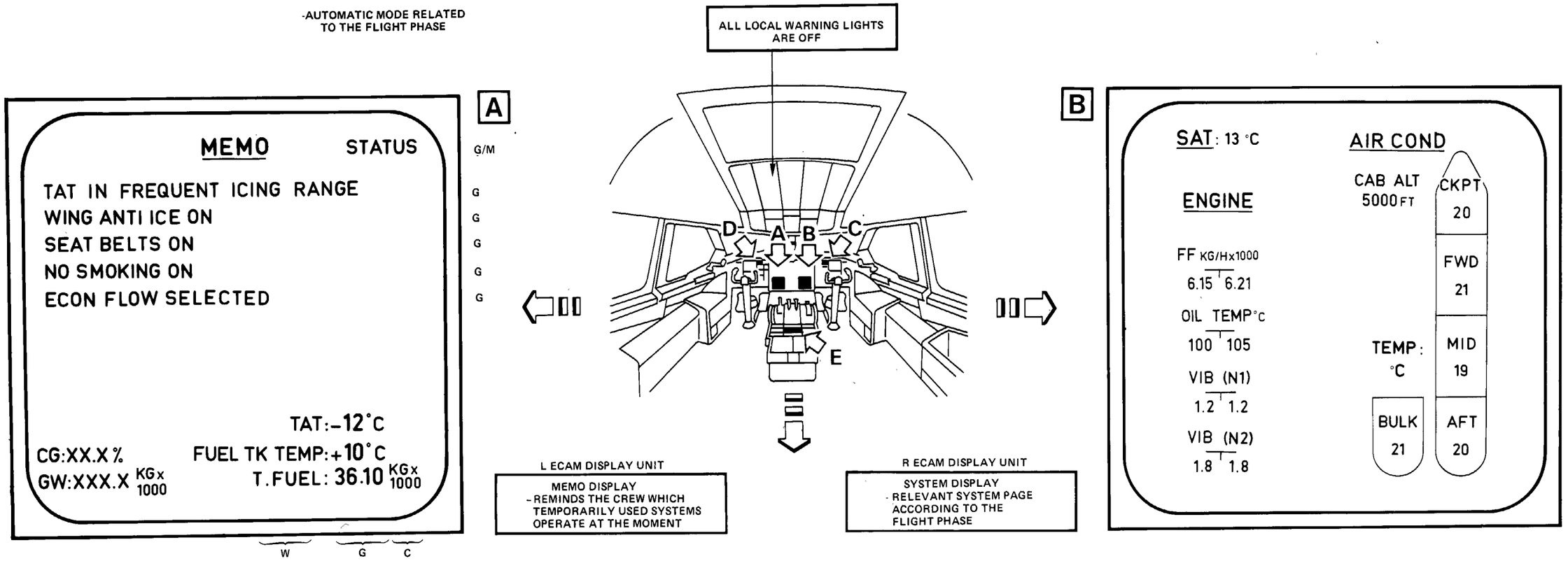


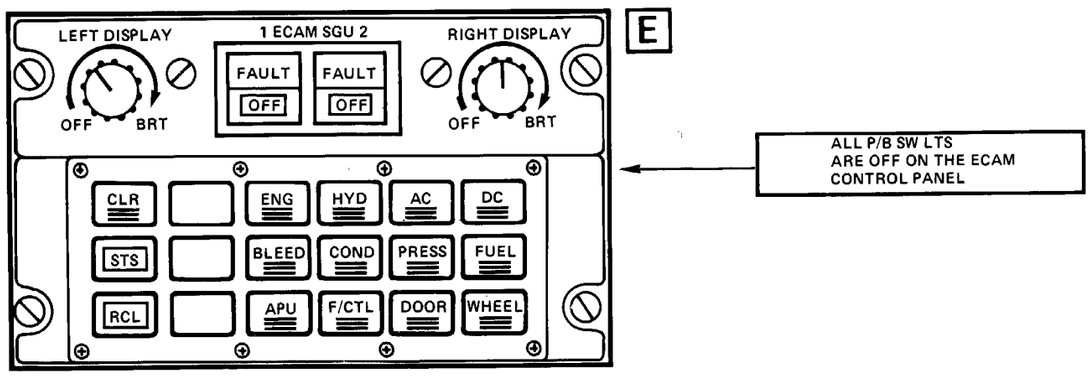


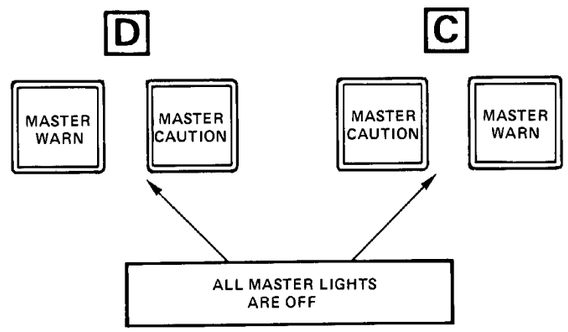


BM5 31 51 00 0 TVO2 28

Operation without Aircraft System Failure
Automatic Mode Related to the Flight Phase
Figure 031







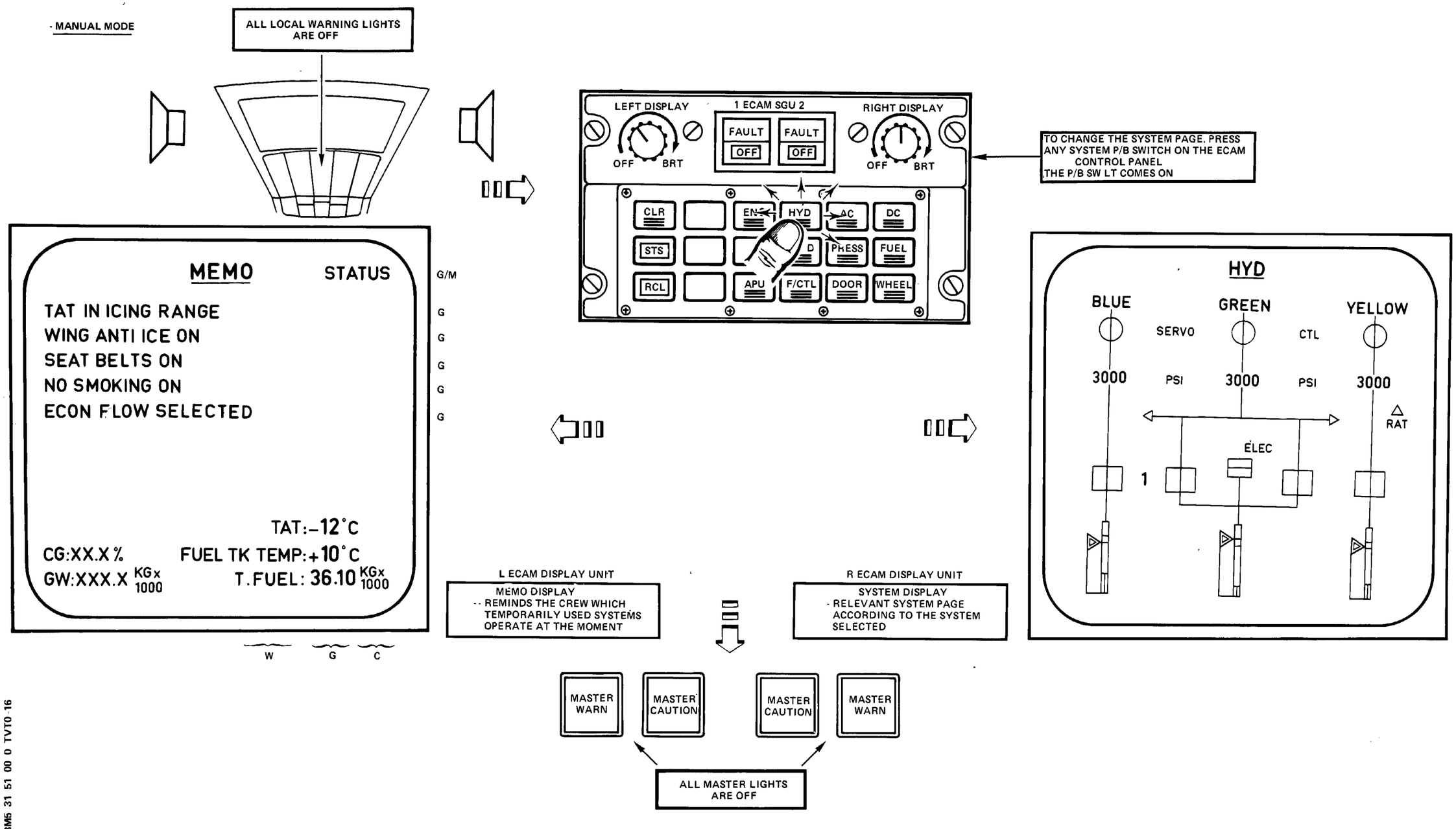
BM5 31 51 0u 0 TVQ3 28

Operation without Aircraft System Failure
Automatic Mode Related to the Flight Phase
Figure 032

R EFFECTIVITY: 005-005,

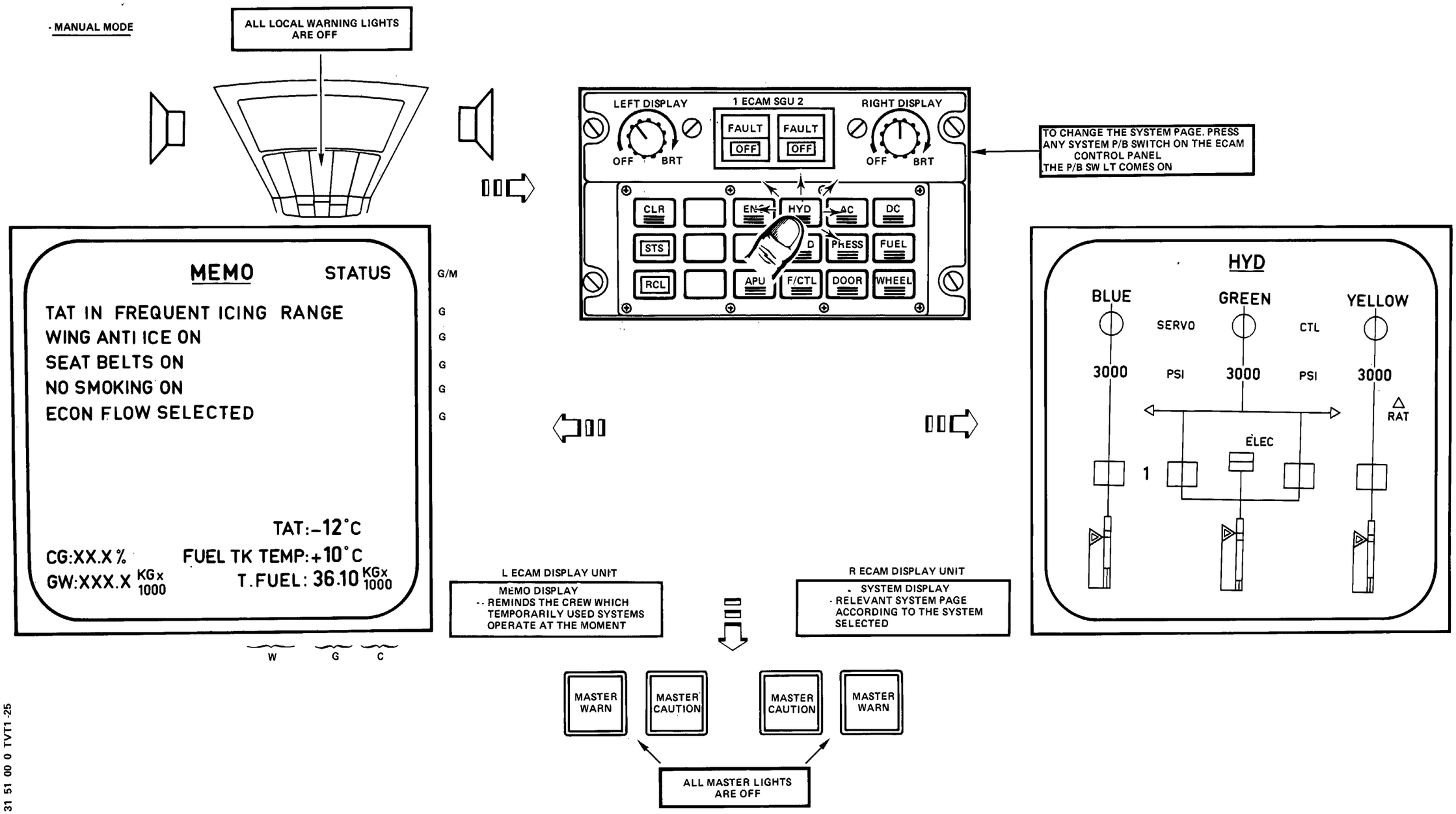
PIA

Printed in France



BM5 31 51 00 0 TVT0 16

Operation without Aircraft System Failure
Manual Mode
Figure 033

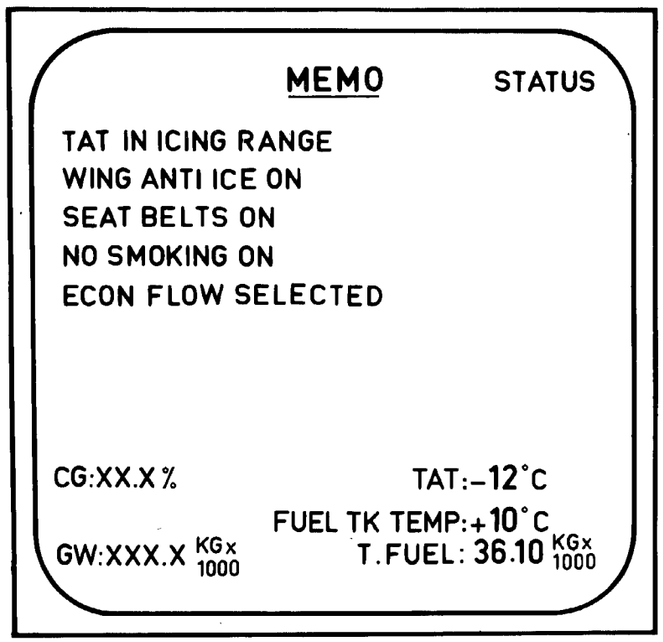


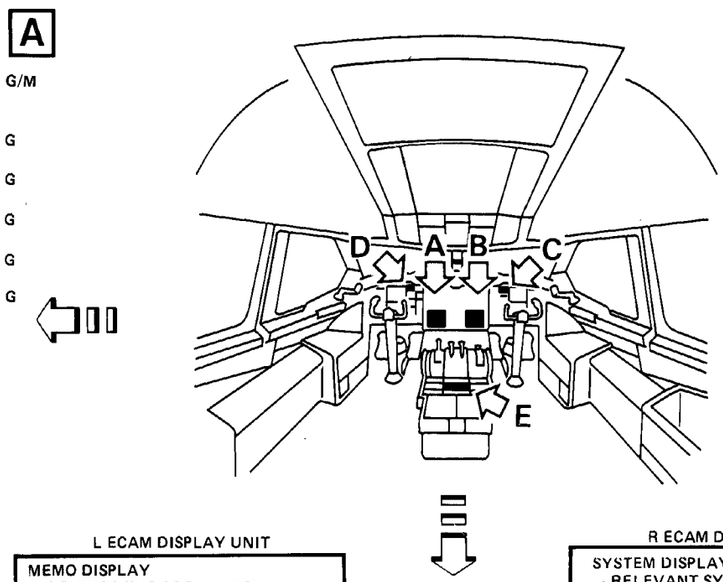
BM5 31 51 00 0 TVT1-25

Operation without Aircraft System Failure
Manual Mode
Figure 034

- AUTOMATIC ADVISORY MODE

ALL LOCAL WARNING LIGHTS ARE OFF



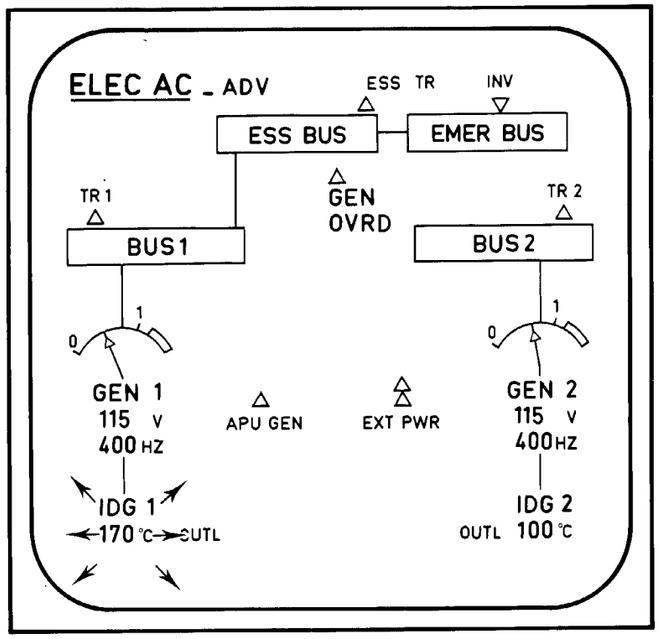


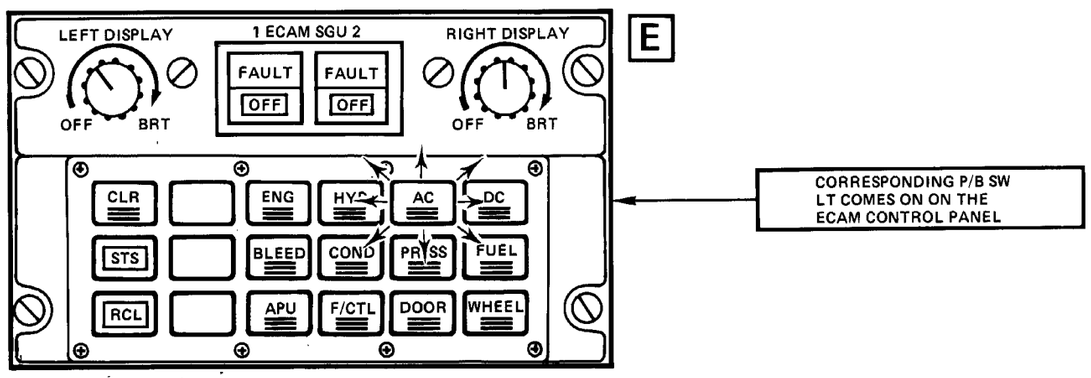
L ECAM DISPLAY UNIT

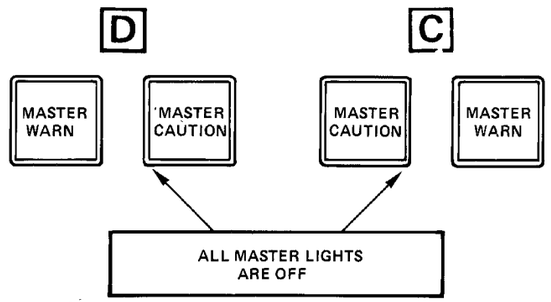
MEMO DISPLAY
- REMINDS THE CREW WHICH TEMPORARILY USED SYSTEMS OPERATE AT THE MOMENT

R ECAM DISPLAY UNIT

SYSTEM DISPLAY
- RELEVANT SYSTEM PAGE ACCORDING TO THE PARAMETER DRIFT







BM5 31 51 00 0 TVX0-16

Operation without Aircraft System Failure
Automatic Advisory Mode
Figure 035

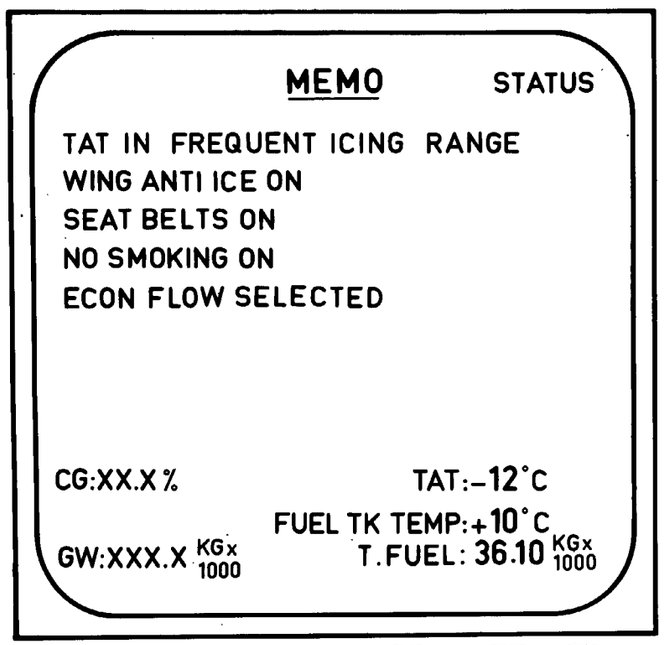
R EFFECTIVITY: 001-004, 006-100,

PIA

Printed in France

- AUTOMATIC ADVISORY MODE

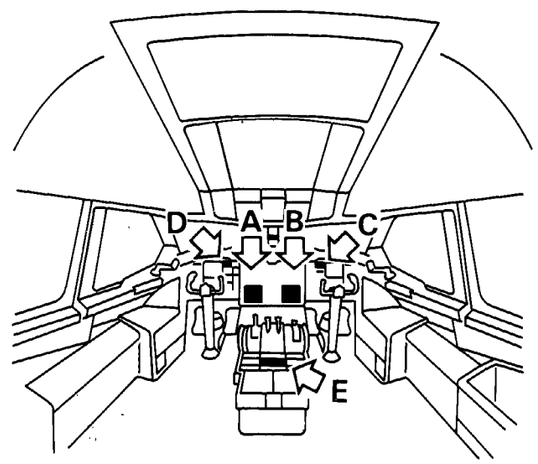
ALL LOCAL WARNING LIGHTS ARE OFF



A

G/M
G
G
G
G
G

W G C



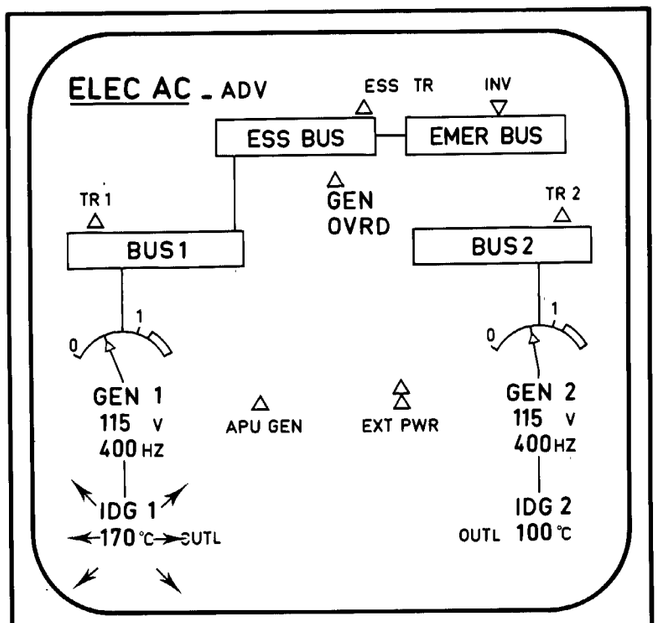
L ECAM DISPLAY UNIT

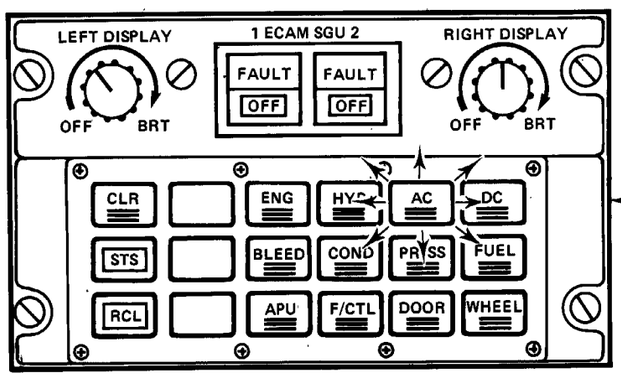
MEMO DISPLAY
- REMINDS THE CREW WHICH TEMPORARILY USED SYSTEMS OPERATE AT THE MOMENT

R ECAM DISPLAY UNIT

SYSTEM DISPLAY
- RELEVANT SYSTEM PAGE ACCORDING TO THE PARAMETER DRIFT

B

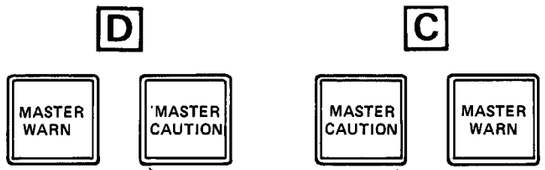




E

CORRESPONDING P/B SW LT COMES ON ON THE ECAM CONTROL PANEL

D C

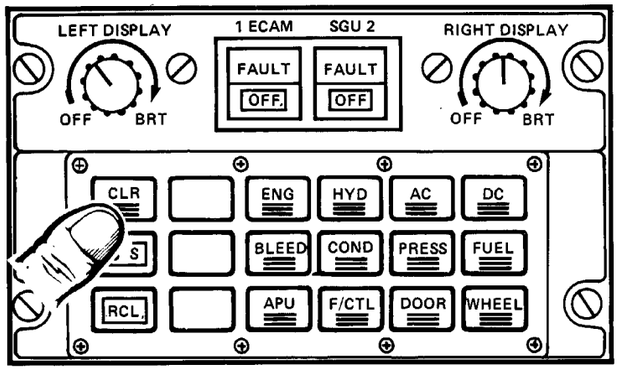


ALL MASTER LIGHTS ARE OFF

BM5 31 51 00 0 TVX1 25

Operation without Aircraft System Failure
Automatic Advisory Mode
Figure 036

CLEARING OF THE STATUS INFORMATION



E

PRESS THE CLR P/B SWITCH
CLR LT GOES OFF

D C

MASTER WARN | MASTER CAUTION | MASTER CAUTION | MASTER WARN

ALL MASTER LIGHTS ARE OFF

A

MEMO STATUS

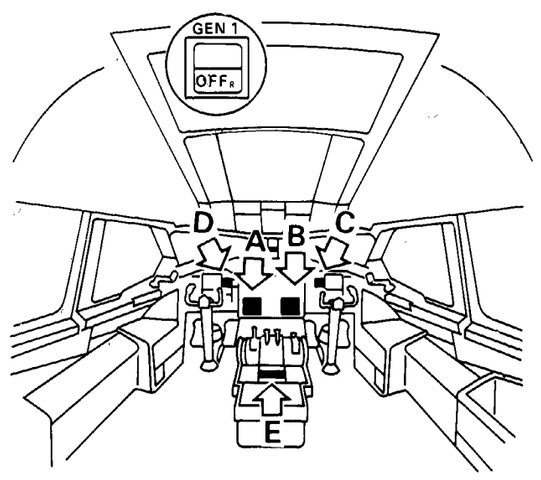
TAT IN ICING RANGE
WING ANTI ICE ON
SEAT BELTS ON
NO SMOKING ON
ECON FLOW SELECTED

TAT: −12°C
CG: XX.X %
FUEL TK TEMP: +10°C
GW: XXX.X KGx1000
T. FUEL: 36 10 KGx1000

G/M
G
G
G

W G C

BM5 31 51 00 0 TWP2 28



L ECAM DISPLAY UNIT

WARNING DISPLAY
- MEMO PAGE

R ECAM DISPLAY UNIT

SYSTEM DISPLAY
- PAGE RELATED TO THE FLIGHT PHASE

B

SAT: 13 °C

AIR COND

CAB ALT 5000 FT

CKPT 20

ENGINE

FF KG/Hx1000
6.15 6.21

OIL TEMP °C
100 105

VIB (N1)
1.2 1.2

VIB (N2)
1.8 1.8

TEMP °C

FWD 21

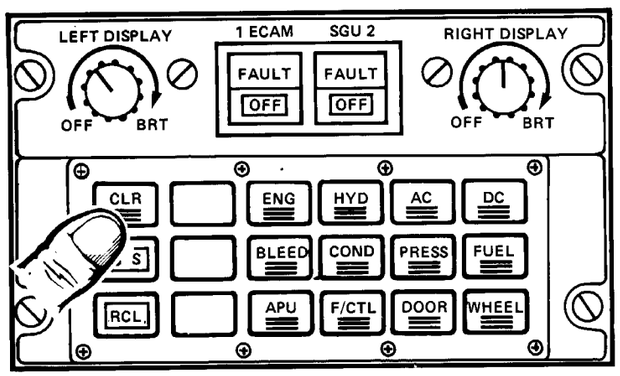
MID 19

BULK 21

AFT 20

Operation with an Independent Aircraft System Failure
Clearing of the STATUS Information
Figure 037

CLEARING OF THE STATUS INFORMATION



E

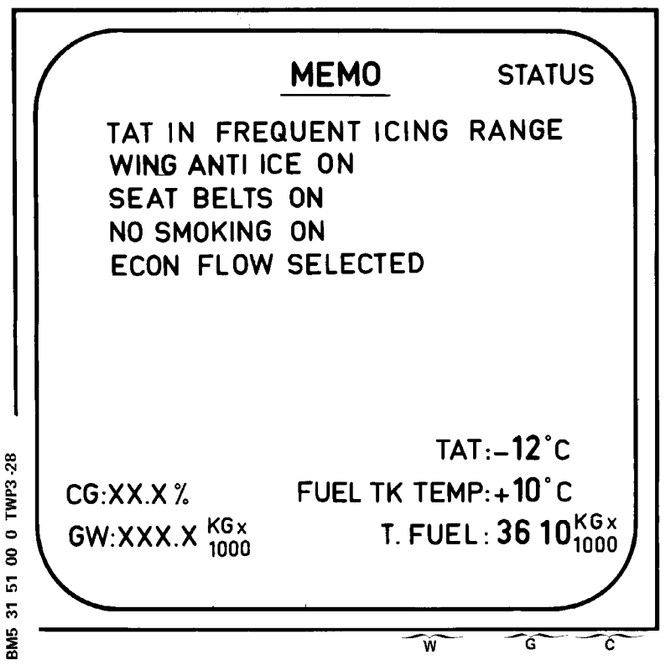
PRESS THE CLR P/B SWITCH
CLR LT GOES OFF

D C

MASTER WARN | MASTER CAUTION | MASTER CAUTION | MASTER WARN

ALL MASTER LIGHTS ARE OFF

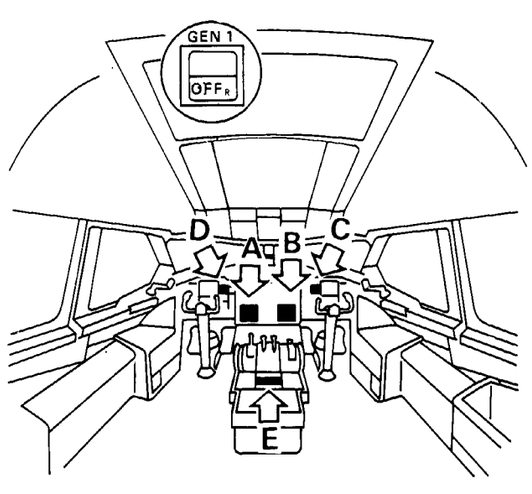
A B



G/M
G
G
G

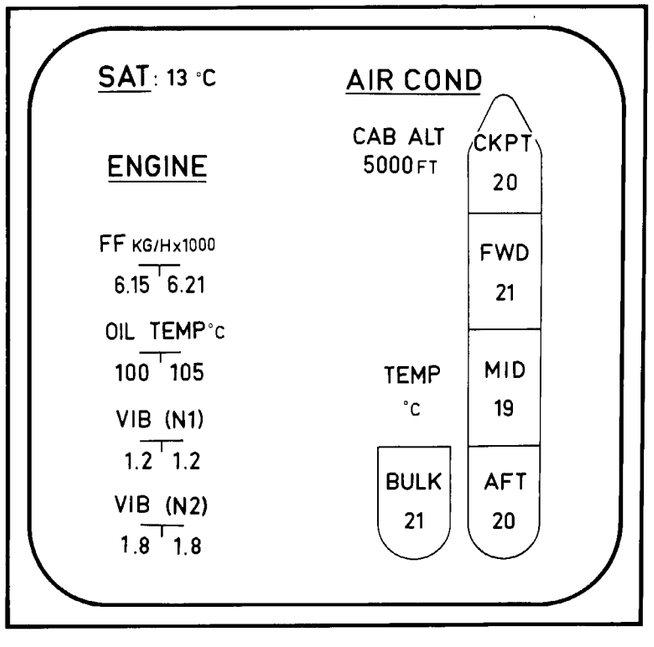
L ECAM DISPLAY UNIT

WARNING DISPLAY
- MEMO PAGE



R ECAM DISPLAY UNIT

SYSTEM DISPLAY
- PAGE RELATED TO THE FLIGHT PHASE



BM5 31 51 00 0 TWP3-28

Operation with an Independent Aircraft System Failure
Clearing of the STATUS Information
Figure 038

R EFFECTIVITY: 005-005,

PIA

L. R ECAM Display Unit

(1)Normal display

In normal operation (without display unit failure), the R ECAM display unit presents one of the system synoptic diagrams.

(2)System presentation

(a)Synoptic diagrams

(Ref. Fig. 039)

R

(b)Alphanumeric and analog indications

The alphanumeric values or analog indications are green when no warning threshold has been reached.

The warning ranges are shown in the color related to the warning level (amber or red).

Unavailable values are replaced by a double X in amber.

When a warning threshold is reached, the pointer and the numerical value become amber (or red).

All the units are shown in cyan.

The system titles are shown in white if the system page is called manually or by an advisory situation (in this last case the title is followed by the mention ADV written in white (flashing) until the associated system P/B switch on the control panel is pressed).

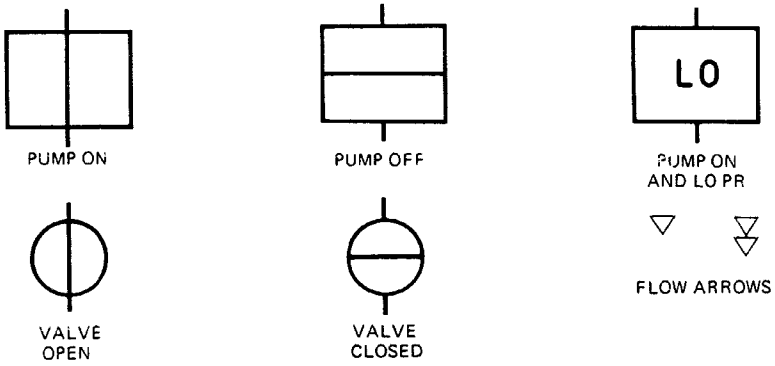
In all the other cases the system titles are green.

(c)System pages

The complete list of system pages is :

R 1 AIR COND
R (Ref. Fig. 040)
R 2 CAB PRESS (Ref. Fig. 041, 042)
R 3 AIR BLEED
R (Ref. Fig. 043)
R (Ref. Fig. 044)
R (Ref. Fig. 045)
R 4 ELEC AC (Ref. Fig. 046, 047, 048)
R 5 ELEC DC (Ref. Fig. 049)
R 6 FLT CTL
R (Ref. Fig. 050)

SYMBOLOGY

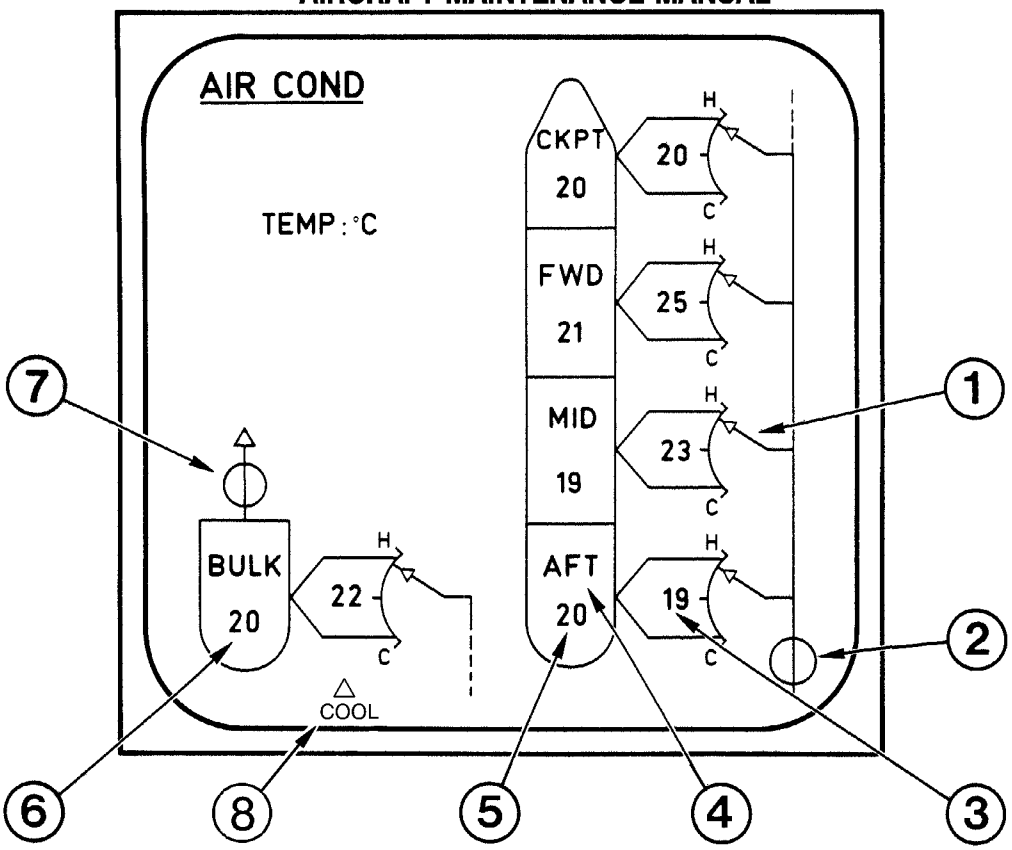


· COLOR CODING THE PART OF THE SYNOPTIC DIAGRAM IS :	COLOR
OK NOT USABLE NOT IN USE OFF WRITTEN NORMAL OFF NOT WRITTEN ABNORMAL OFF NOT WRITTEN	GREEN AMBER NOT SHOWN WHITE GREEN AMBER

PUMPS ON OR VALVES OPEN ARE SHOWN IN GREEN OR AMBER ACCORDING TO THE SYNOPTIC DIAGRAM COLORS. IF DATA IS NOT AVAILABLE THE SYNOPTIC DIAGRAM IS NOT SHOWN AND REPLACED BY THE MENTION NO DATA AVAILABLE WRITTEN IN AMBER

BM5 31 51 00 0 RDPO - 10
DM5

Synoptic Diagrams - Symbology
Figure 039



1 - TRIM AIR VALVE POSITION INDICATION (G)

H HOT VALVE 100 % OPEN
C - COLD - VALVE FULLY CLOSED
(A) WHEN HOT AIR SUPPLY VALVE CLOSED

2 - HOT AIR SUPPLY VALVE

(G) : VALVE OPEN

(A) : VALVE CLOSED

3 - DUCT TEMPERATURE (G)
(A) WHEN DUCT t° ≥ 88°C

4 - COMPARTMENT IDENTIFIER (W)
(A) WHEN DUCT t° ≥ 88° C

5 - COMPARTMENT TEMPERATURE (G)

6 - CARGO COMPARTMENT TEMPERATURE (G)
FLASHES WHEN t° > 33°C

7 - CARGO ISOLATION VALVE

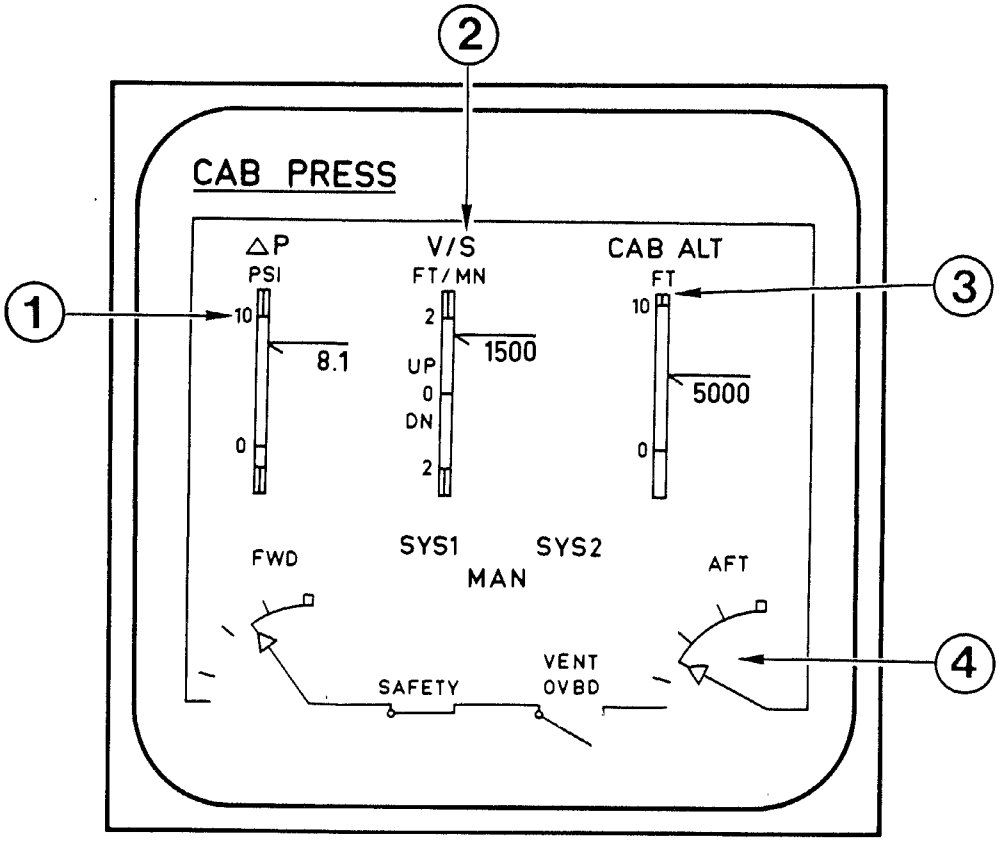
(G) : VALVE OPEN

(A) : VALVE CLOSED

8 . CARGO COOLING OFF INDICATION BUG
(W) WHEN CARGO COOLING IS OFF

BM5 31 51 00 0 ADW2 00

AIR COND System Display
Figure 040



1 - CABIN DIFFERENTIAL PRESSURE (G)
FLASHES WHEN ΔP ≥ 8.6 PSI
(A) WHEN Δ P ≤ −1 PSI
≥ 10 PSI

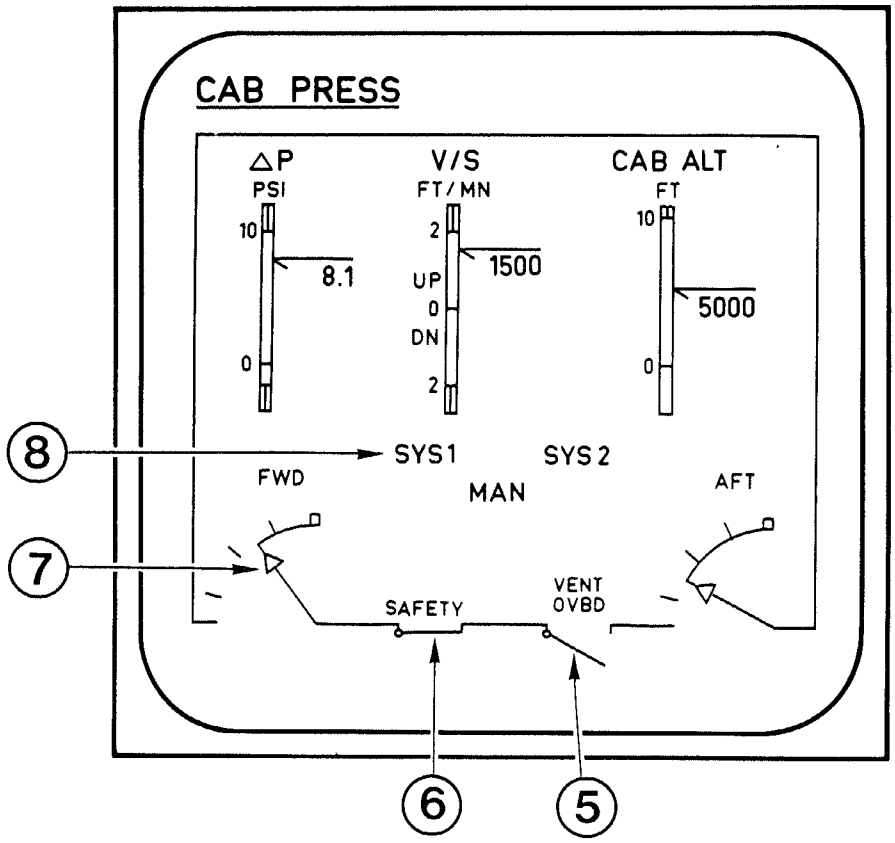
2 - CABIN VERTICAL SPEED (G)
FLASHES WHEN V/S ≥ V/S SELECTED + 50 %
(A) WHEN V/S ≤ − 2000 Ft/mn
≥ 2000 Ft/mn

3 - CABIN ALTITUDE (G)
(R) WHEN CABIN ALTITUDE ≥ 10000 Ft

4 - REGULATING VALVE (G)
FLASHES WHEN AFT REGUL VALVE POSITION DIFFERS FROM THE FWD REGUL VALVE POSITION MORE THAN 40%.
(A) WHEN OPEN ≥ 95% IN FLIGHT ONLY

BM5 31 51 00 0 AED0 -09-04
DM5

CAB PRESS System Display (1/2)
Figure 041



5 - EXTRACT VALVE
VENT OVBD (W)
(G) VALVE FULLY CLOSED
VENT OVBD (W)
(G) VALVE PARTIALLY OPEN
VENT OVBD (A)
(A) VALVE FULLY OPEN ONLY IN FLIGHT (STAYS (G) ON GROUND)

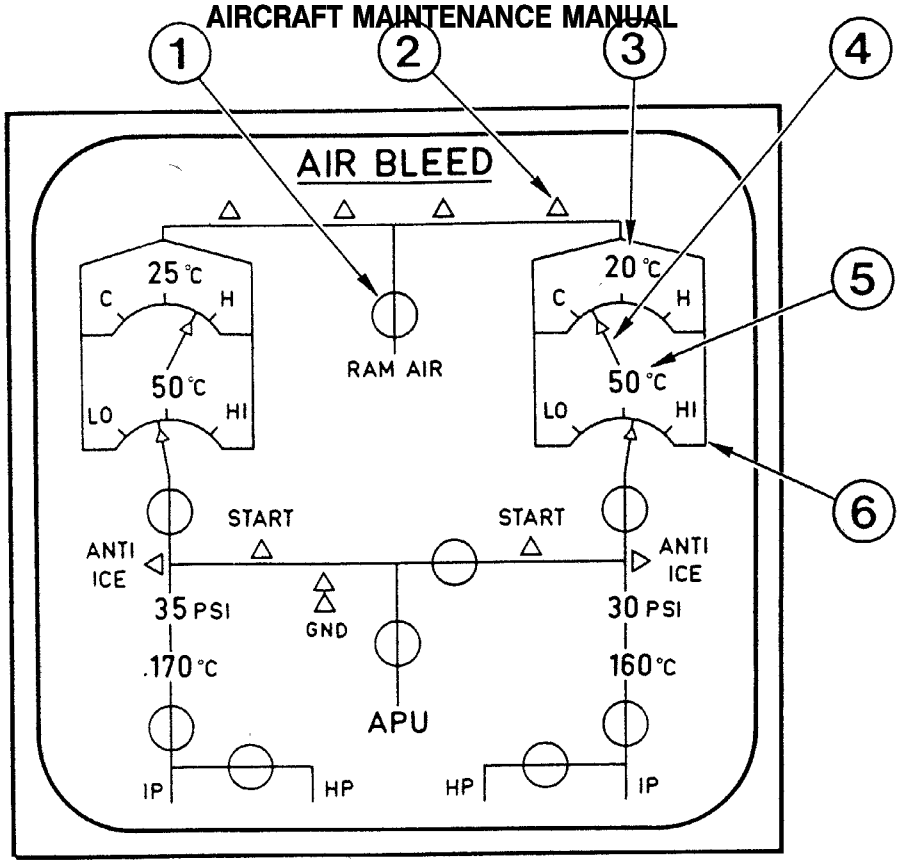
6 - FWD AFT SAFETY VALVES
SAFETY (W)
(G) VALVE FULLY CLOSED
SAFETY (A)
(A) VALVE OPEN

7 - REGULATING VALVE (G)
FLASHES WHEN AFT REGULATING VALVE POSITION DIFFERS FROM THE FWD REGULATING VALVE POSITION MORE THAN 40%
(A) WHEN OPEN ≥ 95% IN FLIGHT ONLY

8 - ACTIVE SYSTEM INDICATION
SYS 1 (G) WHEN ON
SYS 1 (A) WHEN FAULT OR SW OFF
NOT DISPLAYED WHEN NOT ACTIVE
SYS 2 (G) WHEN ON
SYS 2 (A) WHEN FAULT OR SW OFF
NOT DISPLAYED WHEN NOT ACTIVE
MAN (W) WHEN SYS 1 AND SYS 2 FAULT OR SW OFF

BM5 31 51 00 0 AEE0 -09 -04
DM5

CAB PRESS System Display (2/2)
Figure 042



1 - RAM AIR INLET VALVE

(G) : VALVE OPEN

(G) : VALVE CLOSED

2 - COLD AIR DUCT SUPPLY (G)

(A) WHEN NO COLD AIR IS SUPPLIED

3 - PACK DISCHARGE TEMPERATURE (G)

(A) WHEN $t^{o} \leq 18^{o}C$

4 - PACK TEMPERATURE CONTROL VALVE (G)

C - COLD, VALVE CLOSED
H - HOT, VALVE FULLY OPEN

5 - TURBINE INLET TEMPERATURE (G)

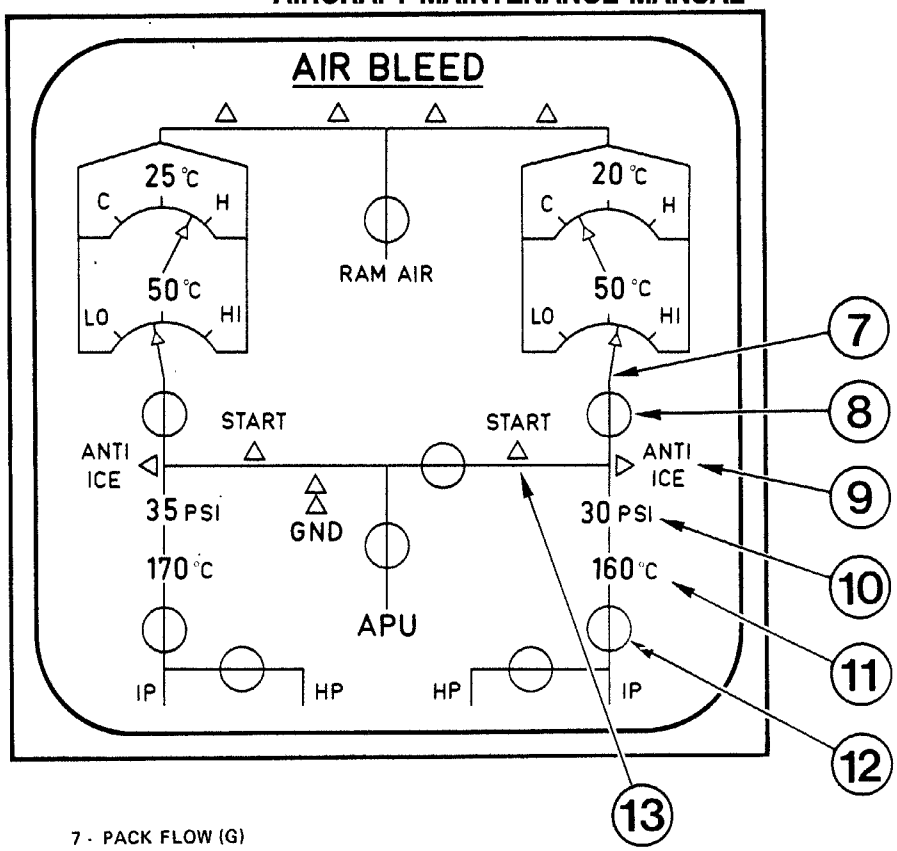
FLASHES WHEN $t^{o} \geq 95^{o}$ C AND $< 120^{o}C$
(A) WHEN $t^{o} \geq 120^{o}$ C

6 - PACK SYMBOL (W)

(A) WHEN PACK INOPERATIVE, PACK VALVE CLOSED AND ENG START NOT SELECTED

BM5 31 51 00 0 AEH0 -09 -04
DM5

AIR BLEED System Display (1/3)
Figure 043



7 - PACK FLOW (G)
(A) WHEN ΔP ≤ 0.50 PSI

8 - PACK VALVE
(G) : VALVE OPEN
(A) : VALVE CLOSED

9 - WING ANTI-ICE (NOT DISPLAYED)
ANTI ICE (G) (W) WHEN WING SUPPLY P/B SWITCH IS SELECTED ON

10 - PRECOOLER INLET PRESSURE (G)
(A) WHEN P ≤ 8 PSI
≥ 57 PSI
XX(A) IF POWER SUPPLY LOSS FOR CONTROLLER INDICATOR

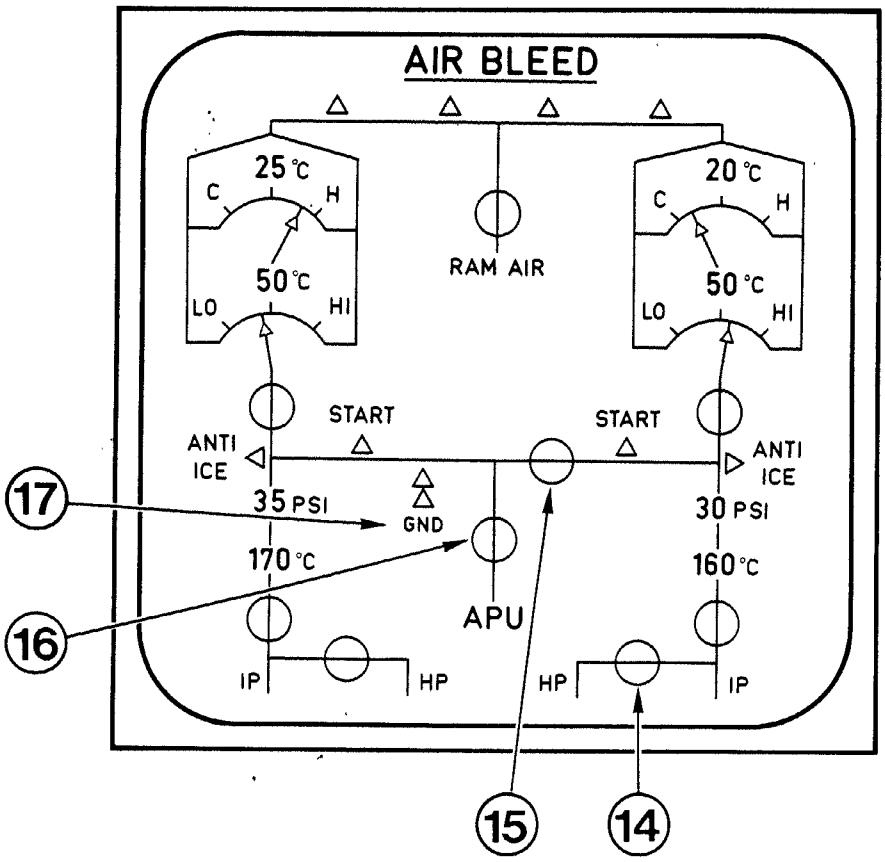
11 - PRECOOLER OUTLET TEMPERATURE (G)
(A) WHEN t° ≥ 207°C/255°C
HIGHER VALUE VALID WHEN WING ANTI ICE ON

12 - BLEED VALVE
(G) : VALVE OPEN
(A) : VALVE CLOSED

13 - ENGINE START (NOT DISPLAYED)
START (W) (G) WHEN ENG START SELECTOR IS IN START A OR B OR CRANK POSITION

BM5 31 51 00 0 AEJ1 25 20
DM5

AIR BLEED System Display (2/3)
Figure 044



14 - HP VALVE

- AUTOMATIC MODE

(G) : VALVE OPEN

(G) : VALVE CLOSED

- OFF MODE (HP VALVE P/B SWITCH IS SELECTED OFF)

(A) : VALVE OPEN } ACCORDING TO THE VALVE POSITION

(A) : VALVE CLOSED }

15 - X-FEED VALVE

(G) : VALVE OPEN

(G) : VALVE CLOSED

16 - APU BLEED VALVE

(G) : VALVE OPEN

(G) : VALVE CLOSED

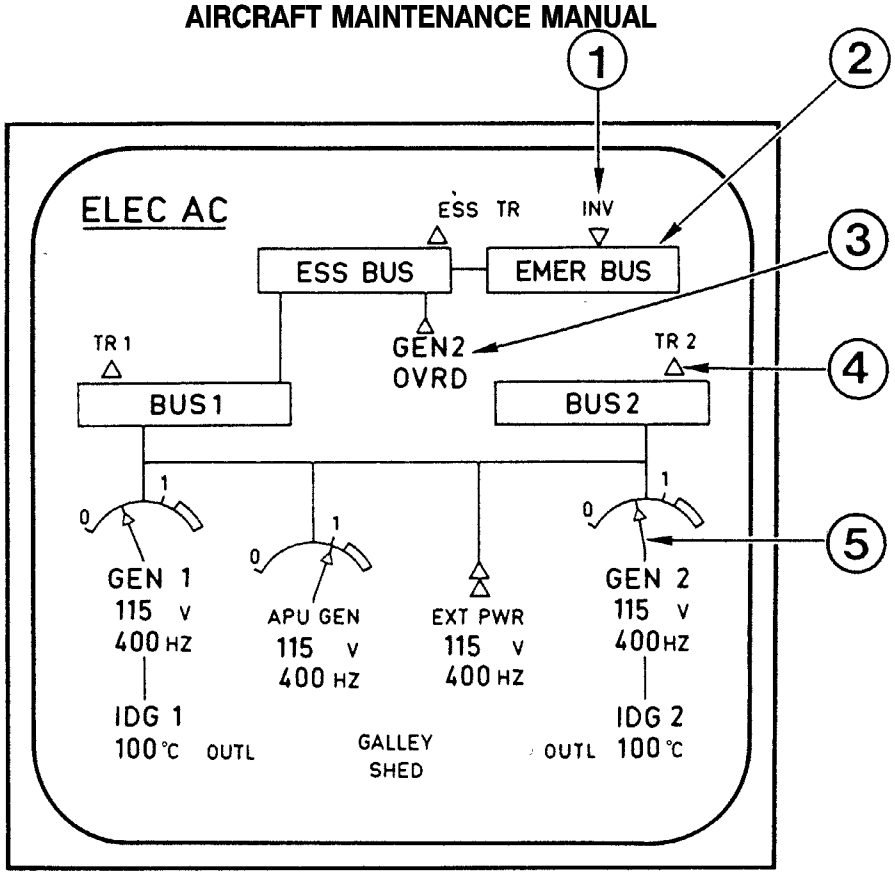
△ (W) : REPLACES VALVE INDICATION WHEN APU MASTER SW IS IN OFF POSITION

17 - GROUND SUPPLY (NOT DISPLAYED IN FLIGHT(

GND (W) : (INDEPENDANT OF GROUND SUPPLY CONNECTION)

BM5 31 51 00 0 AEK0 23 18
DM5

AIR BLEED System Display (3/3)
Figure 045



1 - EMERGENCY INVERTER (W)

2 - EMERGENCY BUS

3 - GENERATOR 1 OR 2 OVERRIDES AC BUS 1

GEN 1 OVRD (W) : GENERATOR 1 SUPPLIES AC ESS BUS

GEN 2 OVRD (W) : GENERATOR 2 SUPPLIES AC ESS BUS

GEN OVRD (W) : NO OVERRIDE

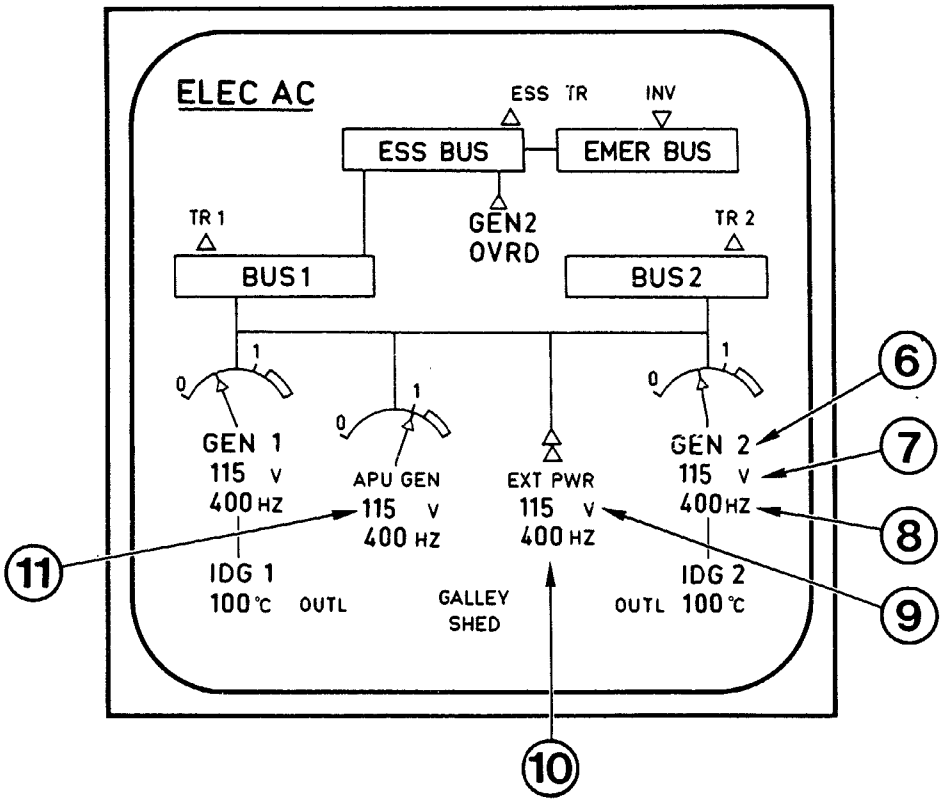
4 - AC BUS AND TRANSFORMER RECTIFIER

TR 2 (W)
(W)
BUS 2 (G) WHEN SUPPLIED
TR 2 (A)
(A)
BUS2 (A) WHEN NOT SUPPLIED

5 - GENERATOR LOAD (G)
(A) WHEN LOAD ≥ 110%
NOT DISPLAYED WHEN GEN P/B SWITCH IS SELECTED OFF/R

BM5 31 51 00 0 AEP0 -09-04
DM5

ELEC AC System Display (1/3)
Figure 046



6 - GEN 2 (W)
(A) WHEN GEN P/B SWITCH IS SELECTED OFF/R

7 - GENERATOR VOLTAGE (G)
(A) WHEN VOLTAGE ≤ 110V
≥ 120V
OFF (W) REPLACES VOLTAGE INDICATION WHEN GEN P/B SWITCH IS SELECTED OFF/R

8 - GENERATOR FREQUENCY (G)
(A) WHEN FREQUENCY ≤ 390 HZ
≥ 410 HZ
NOT DISPLAYED WHEN GEN P/B SWITCH IS SELECTED OFF/R

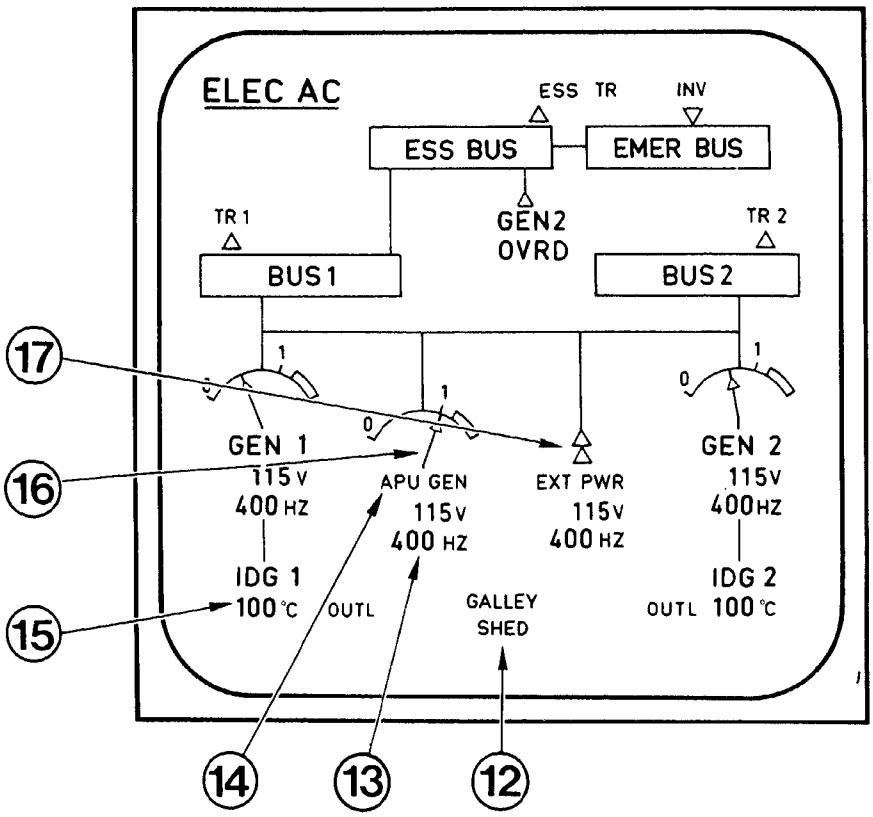
9 - EXTERNAL POWER VOLTAGE (G)
(A) WHEN VOLTAGE ≤ 110V
≥ 120V
NOT DISPLAYED WHEN EXTERNAL POWER VOLTAGE ≤ 50V

10 - EXTERNAL POWER FREQUENCY (G)
(A) WHEN FREQUENCY ≤ 390 HZ
≥ 410 HZ
NOT DISPLAYED WHEN EXTERNAL POWER VOLTAGE ≤ 50V

11 - APU GENERATOR VOLTAGE (G)
(A) WHEN VOLTAGE ≤ 110V
≥ 120V
OFF (W) REPLACES VOLTAGE INDICATION WHEN APU GEN P/B SWITCH IS SELECTED OFF/R - NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION

BMS 31 51 00 0 AEQO - 10
DM5

ELEC AC System Display (2/3)
Figure 047



12 - GALLEY SHED (NOT DISPLAYED IN NORMAL OPERATION)
(W) WHEN SHED

13 - APU GENERATOR FREQUENCY (G)
(A) WHEN FREQUENCY ≤ 390 HZ
≥ 416 HZ
NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION
OR APU GEN P/B SWITCH IS SELECTED OFF/R

14 APU GEN (W)
(A) WHEN APU GEN P/B SWITCH IS SELECTED OFF/R AND
APU MASTER SW IS IN ON POSITION

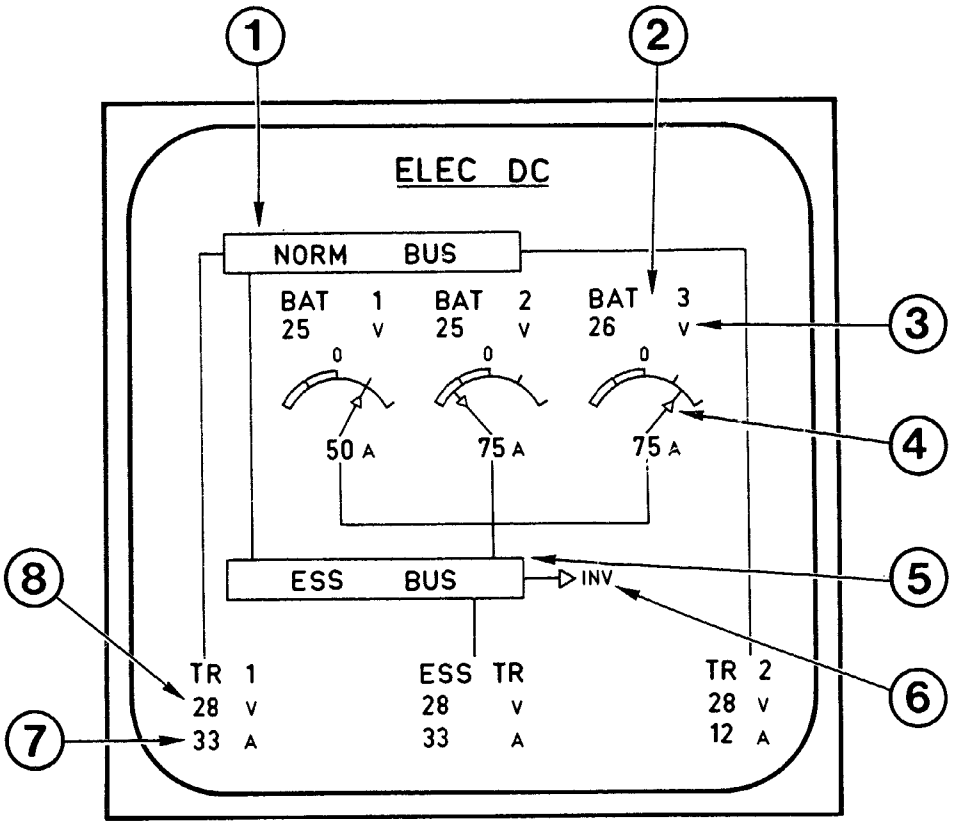
15 - IDG OUTLET OIL TEMPERATURE (G)
FLASHES WHEN t° ≥ 142°C
(A) WHEN t° ≥ 185°C

16 - APU GENERATOR LOAD (G)
(A) WHEN LOAD ≥ 110 %
△ (W) REPLACES LOAD INDICATION WHEN APU MASTER SWITCH
IS IN OFF POSITION

17 - EXT PWR AND △ (W) NOT DISPLAYED IN FLIGHT

BM5 31 51 00 0 AERO -09 -04
DM5

ELEC AC System Display (3/3)
Figure 048



1 - NORMAL BUS

NORM BUS (G) WHEN SUPPLIED

NORM BUS (A) WHEN NOT SUPPLIED

2 - BAT 3 (W)
(A) WHEN BAT P/B SWITCH IS SELECTED OFF/R

3 - BATTERY VOLTAGE (G)
(A) WHEN VOLTAGE ⩽ 25V
⩾ 31V

4 - BATTERY CURRENT (G)

(A) WHEN CURRENT ⩽ −5A
OFF (W) REPLACES DIGITAL AND ANALOG INDICATION
WHEN BAT P/B SWITCH IS SELECTED OFF/R AND
BATTERY CONTACTOR OFF
ARROW AND DIGITAL INDICATION
DISAPPEAR WHEN CONTACTOR OFF

5 - ESSENTIAL BUS

ESS BUS (G) WHEN SUPPLIED

ESS BUS (A) WHEN NOT SUPPLIED

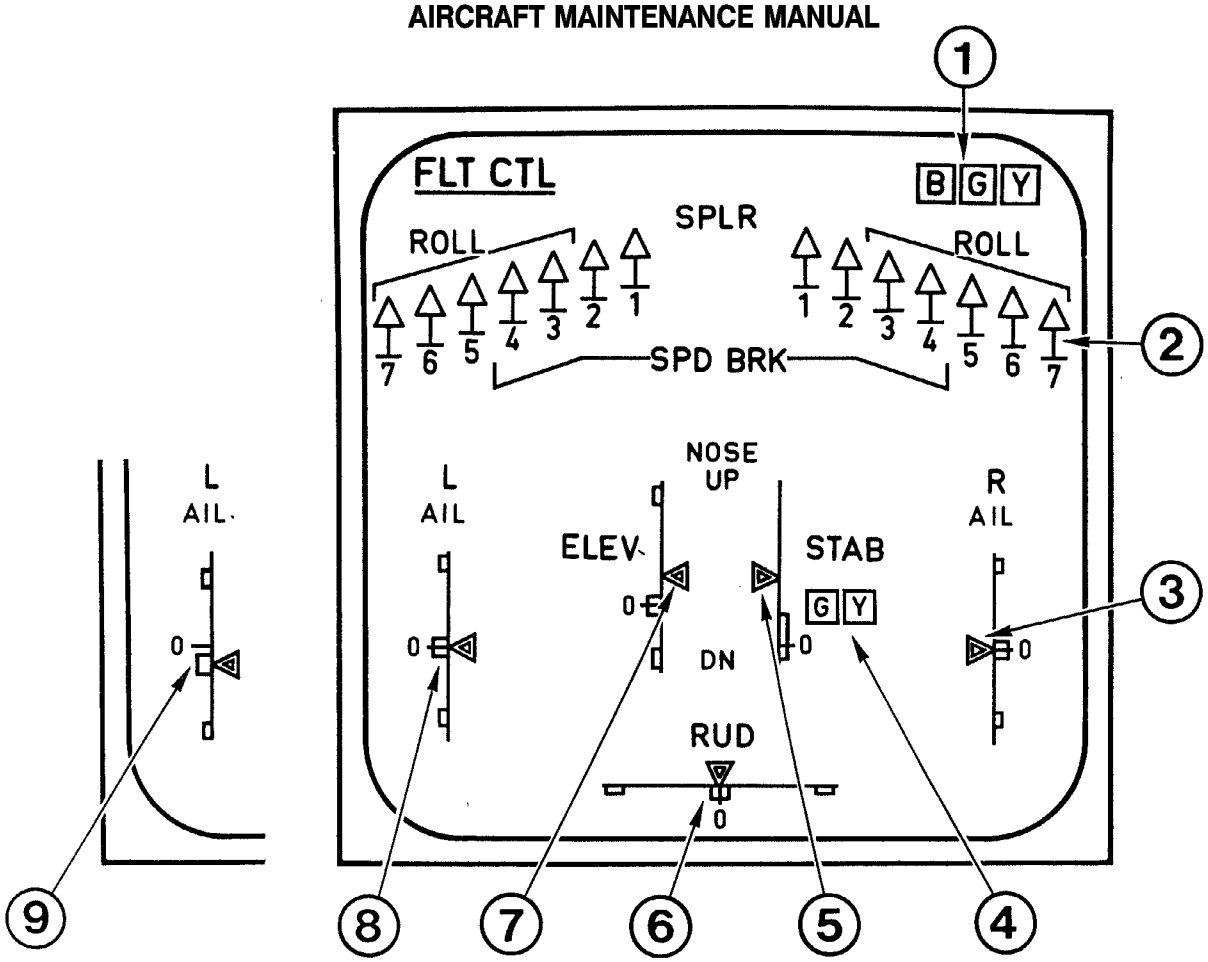
6 - EMERGENCY INVERTER (W)

7 - TRANSFORMER RECTIFIER CURRENT (G)
FLASHES WHEN I ⩽ 6A

8 - TRANSFORMER RECTIFIER VOLTAGE (G)
(A) : VOLTAGE ⩽ 25 V
⩾ 31 V

BM5 31 51 00 0 AEVO - 10
DM5

ELEC DC System Display
Figure 049



1 - SERVO CONTROL HYD PRESSURE (G)

(A) WHEN THERE IS A SERVO CONTROL LOW PRESSURE

2 - SPOILER POSITION INDICATION

(G) : SPOILER EXTENDED

(A) : SPOILER EXTENDED AND FAULT

(G) : SPOILER RETRACTED

(A) : SPOILER RETRACTED AND FAULT

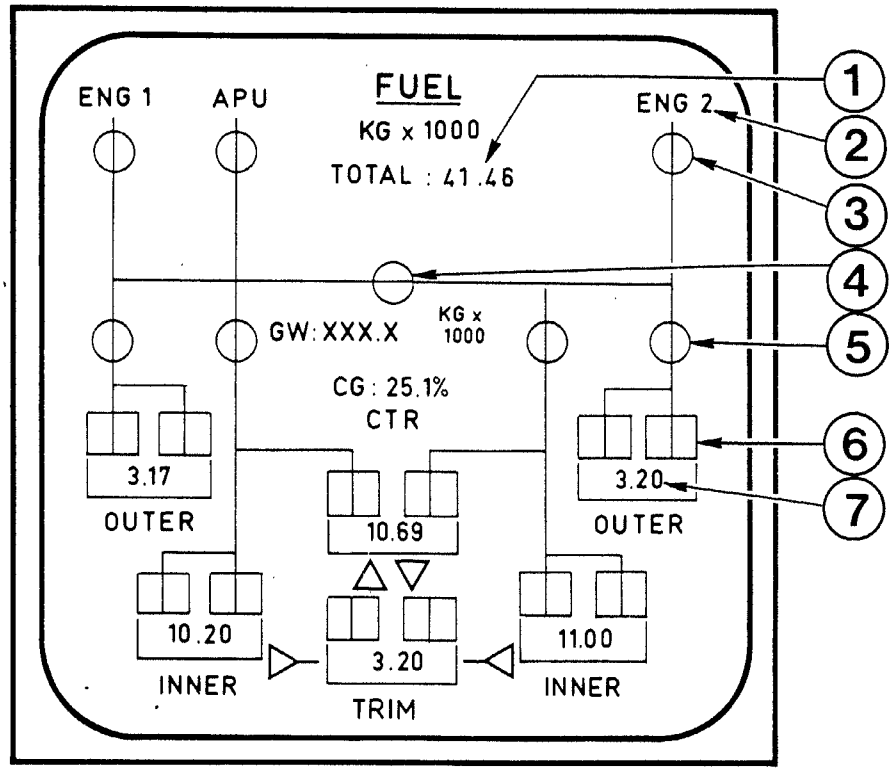
(G) : FLASHES WHEN SPOILER EXTENDED ON GROUND AND SPEED > 70 KT

3 - AILERON POSITION (G)
4 - SERVO CONTROL HYD PRESSURE (G)
(A) WHEN THERE IS A SERVO CONTROL LOW PRESSURE
5 - HORIZONTAL STABILIZER POSITION (G)
6 - RUDDER POSITION (G)
7 - ELEVATOR POSITION (G)
8 - WHEN SLATS RETRACTED
9 - WHEN SLATS EXTENDED

BM5 31 51 00 0 AFB0 15

FLT CTL System Display
Figure 050

R 7 FUEL
R (Ref. Fig. 051)
R (Ref. Fig. 052)
R (Ref. Fig. 053)
R 8 HYD
R (Ref. Fig. 054)
R (Ref. Fig. 055)
R 9 WHEEL
R (Ref. Fig. 056)
R 10 APU
R (Ref. Fig. 057)
R (Ref. Fig. 058)
R 11 DOOR
R (Ref. Fig. 059)
R 12 ENGINE
R (Ref. Fig. 060)
R 13 CRUISE
R (Ref. Fig. 061)

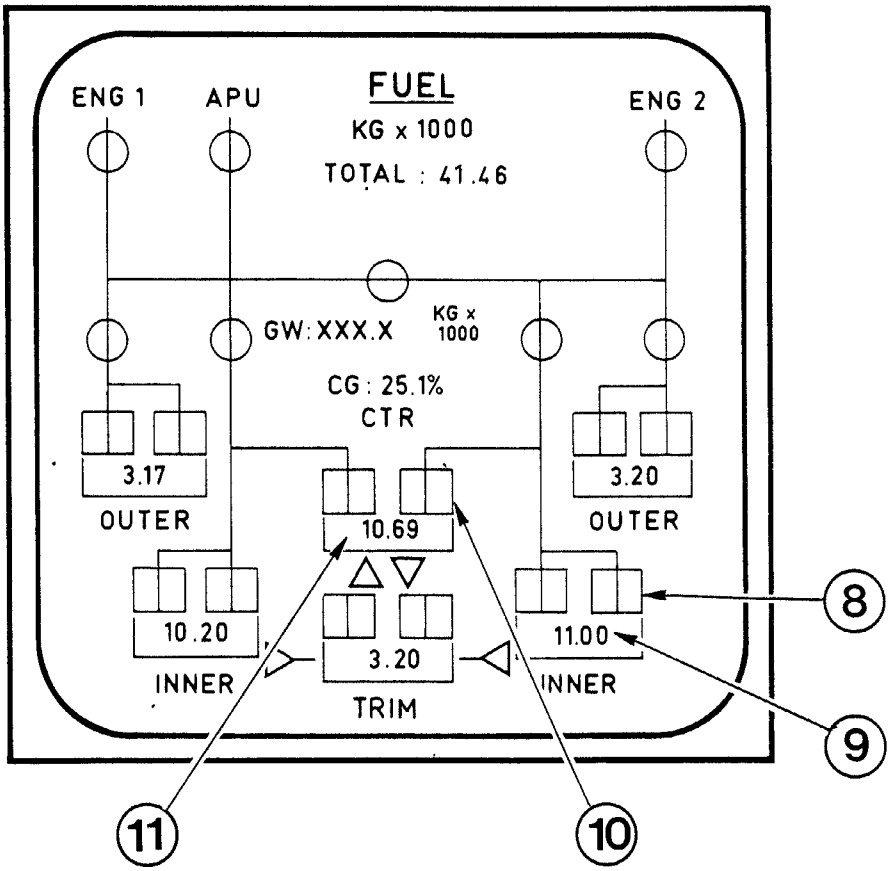


1 - TOTAL FUEL QUANTITY (G)
2 - ENG 2 (W)
(A) : WHEN NO FUEL PRESSURE
3 - LP VALVE (FIRE VALVE)
(G) : VALVE OPEN
(A) : VALVE OPEN WITHOUT FUEL PRESSURE
(A) : VALVE CLOSED
4 - X-FEED VALVE
(G) : VALVE OPEN
(A) : VALVE OPEN WITHOUT FUEL PRESSURE
(G) : VALVE CLOSED
5 - INNER AND OUTER TANK ISOLATION VALVE
(G) : VALVE OPEN
(A) : VALVE OPEN WITHOUT FUEL PRESSURE
(A) : VALVE CLOSED
6 - OUTER TANK PUMP
(G) : PUMP ON AND NORMAL PRESSURE
(A) : PUMP ON AND LOW PRESSURE
(A) : PUMP OFF
7 - OUTER TANK FUEL QUANTITY (G)
FLASHES WHEN FUEL UNBALANCED ≥ 3.00 KG x 1000

BM5 31 51 00 0 STR0 01

FUEL System Display (1/3)
Figure 051

R



8 - INNER TANK PUMP
- (G) : PUMP ON
- LO (A) : PUMP ON AND LOW PRESSURE
- (A) : PUMP SW OFF
- (G) : PUMP SW ON AND CONTACTOR OFF

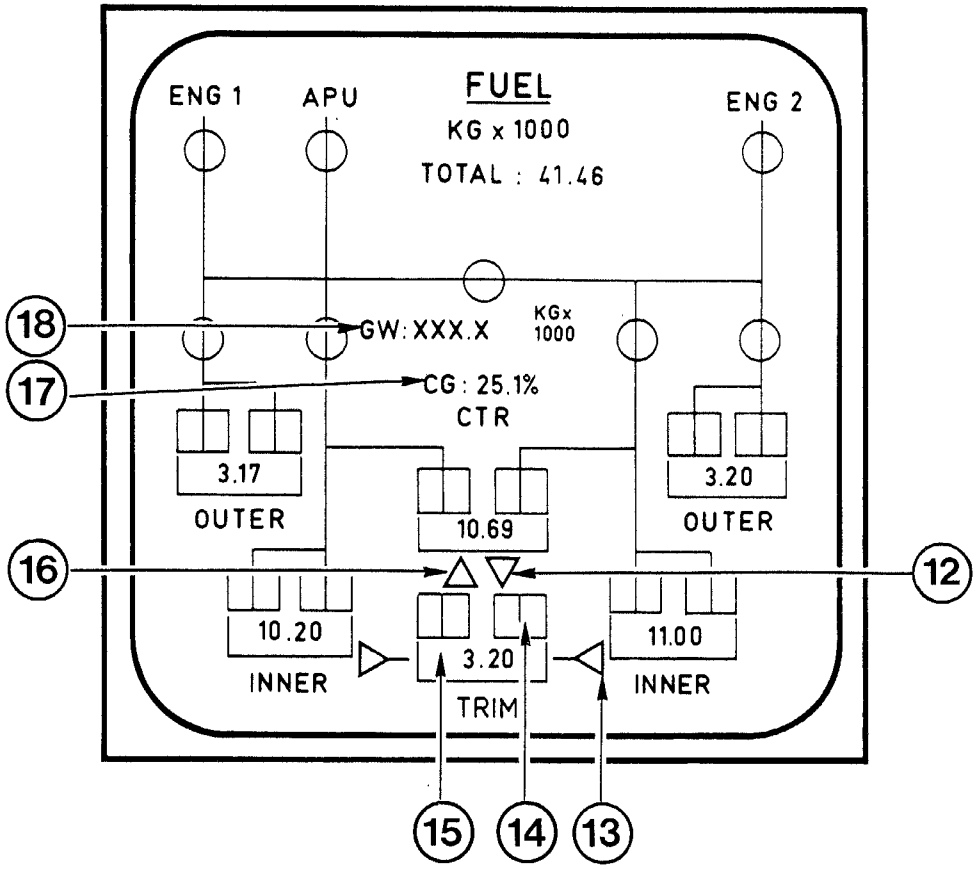
9 - INNER TANK FUEL QUANTITY (G)
FLASHES WHEN
FUEL UNBALANCED ≥ 3.00 KG x 1000

10 - CENTER TANK PUMP
- (G) : PUMP ON
- LO (A) : PUMP ON AND LOW PRESSURE
- (A) : PUMP SW OFF
- (G) : PUMP SW ON AND CONTACTOR OFF

11 - CENTER TANK FUEL QUANTITY (G)

BM5 31 51 00 0 STV0 01

FUEL System Display (2/3)
Figure 052



12 - TRANSFER INDICATION FROM CTR TO TRIM TANK
- (G) : AFT TRANSFER
- (A) : AFT TRANSFER FAULT OR NOT ALLOWED

13 - TRANSFER INDICATION FROM INNER TO TRIM TANK
- (G) : AFT TRANSFER
- (A) : AFT TRANSFER FAULT OR NOT ALLOWED

14 - TRIM TANK PUMP
- (G) : PUMP ON
- (A) : PUMP ON AND LOW PRESSURE
- (A) : PUMP SW OFF
- (G) : PUMP SW ON AND CONTACTOR OFF

15 - TRIM TANK FUEL QUANTITY (G)

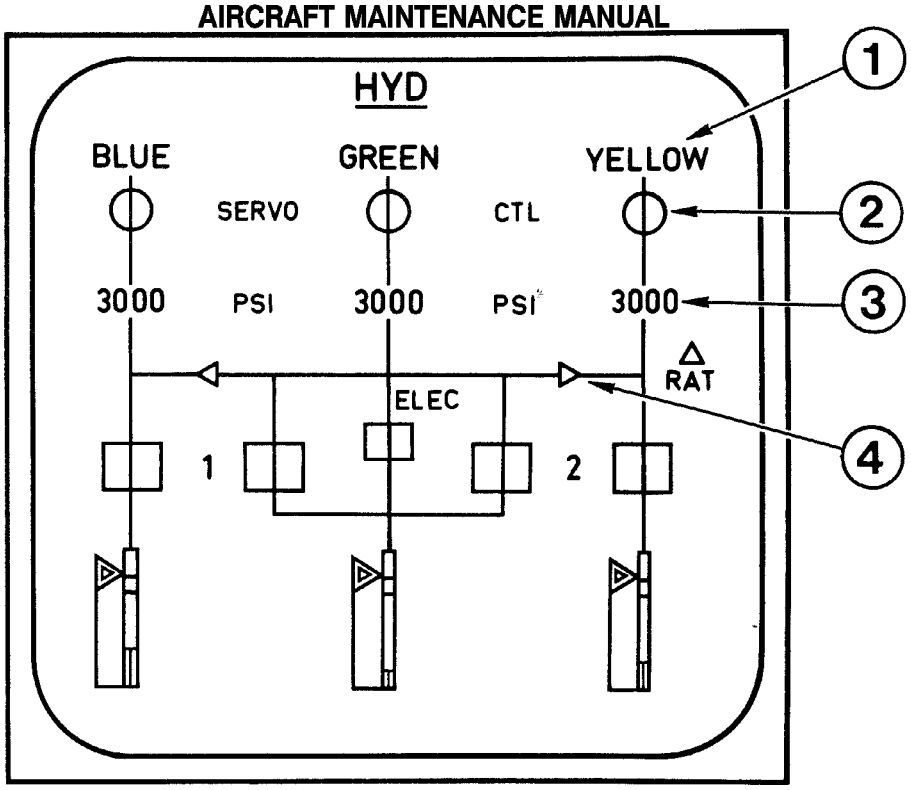
16 - TRANSFER INDICATION FROM TRIM TO CTR TANK
- (W) : NO TRANSFER, WHEN TRANSFER CONTROL FAULT
- (G) : FWD TRANSFER
- (A) : FWD TRANSFER FAULT

17 - CG INDICATION (G)
- (A) : WHEN CG > 40 % ⩽ 17.5 %

18 - GROSS WEIGHT INDICATION (G)

BM5 31 51 00 0 STY0 24

FUEL System Display (3/3)
Figure 053



1 - YELLOW (W)
(A) WHEN THERE IS A SERVO CONTROL LOW PRESSURE

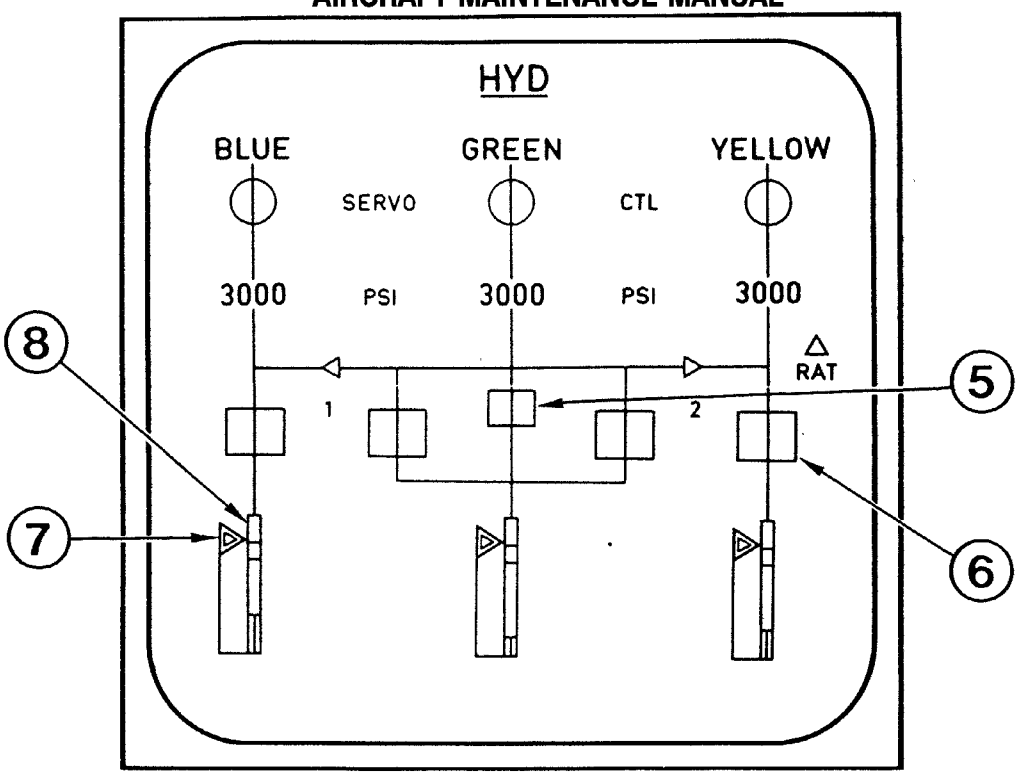
2 - SERVO CONTROL VALVE
(G) : VALVE OPEN
(A) : VALVE OPEN AND PRESSURE ≤ 1450 PSI
(A) : VALVE CLOSED

3 - COLLECTOR PRESSURE (G)
(A) WHEN PRESSURE≤ 1450 PSI

4 - POWER TRANSFER UNIT
(G) : WHEN PTU P/B SWITCH IS SELECTED OFF
(G) : WHEN PTU P/B SWITCH IS SELECTED ON

BM5 31 51 00 0 AFPO - 10
DM5

HYD System Display (1/2)
Figure 054



5 - ELECTRIC PUMPS

(G) - PUMPS OFF

(G) : ONE PUMP ON

LO (A) : PUMP ON AND LOW PRESSURE

6 - ENGINE PUMP

(A) - PUMPS OFF

(G) : ONE PUMP ON

LO (A) : PUMP ON AND LOW PRESSURE

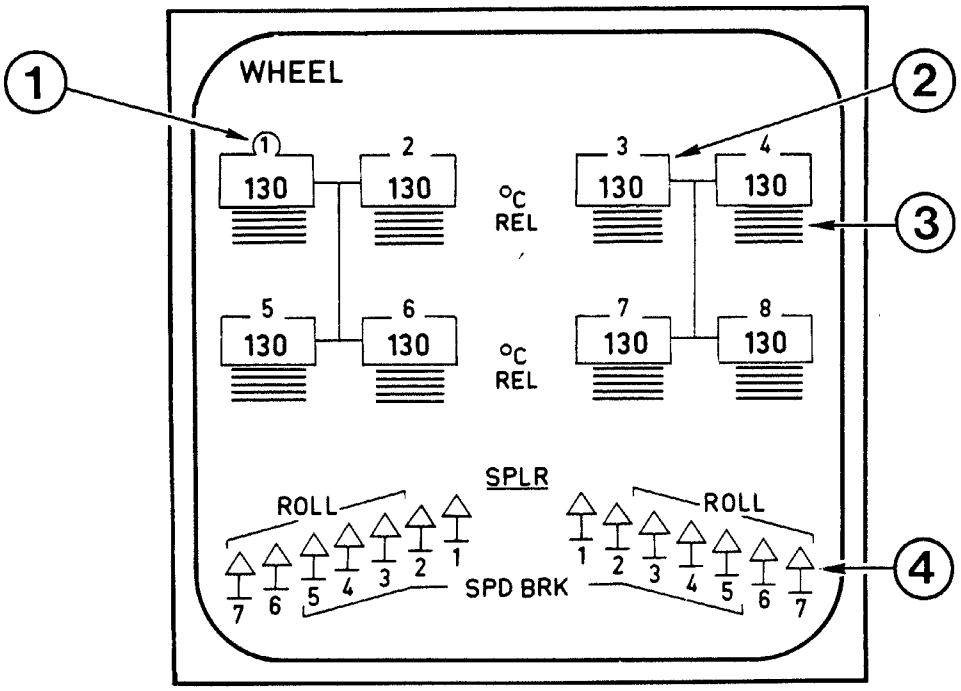
7 - HYDRAULIC FLUID QUANTITY (G)

(A) WHEN QUANTITY ≤ 5 LITERS

8 - NORMAL FULL RESERVOIR MARK (W)

BM5 31 51 00 0 AFQ0 -09 -04
DM5

HYD System Display (2/2)
Figure 055



1 - (1) INDICATES WHEEL WITH THE HOTTEST TEMPERATURE
IF TEMPERATURE ABOVE 100°C

2 - BRAKES TEMPERATURE (G)
(A) WHEN TEMPERATURE ≥ 300°C

3 - BRAKE RELEASE

(G) : BRAKE RELEASED
NOT DISPLAYED WHEN BRAKE NOT RELEASED

4 - SPOILER POSITION INDICATION

(G) : SPOILER EXTENDED

(A) : SPOILER EXTENDED AND FAULT

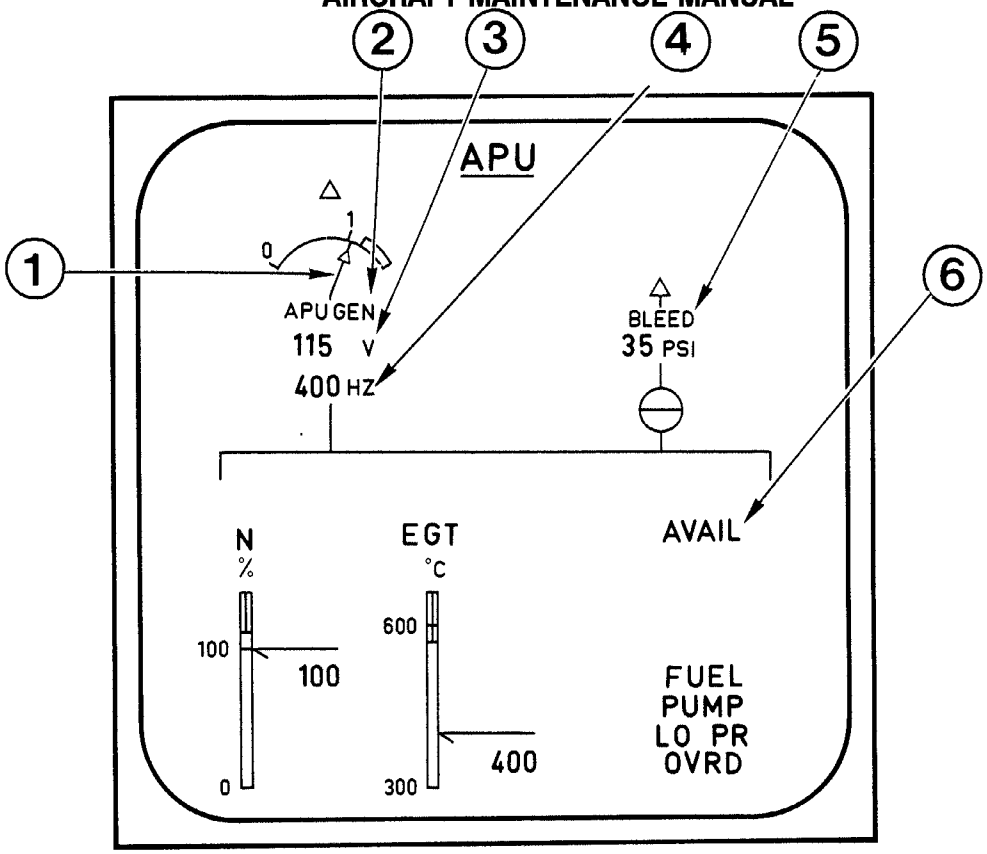
(G) : SPOILER RETRACTED

(A) : SPOILER RETRACTED AND FAULT

(G) : FLASHES WHEN SPOILER EXTENDED ON GROUND AND SPEED ≥ 70 KT

BM5 31 51 00 0 SVC0 15

WHEEL System Display
Figure 056



1 - APU GENERATOR LOAD (G)

(A) WHEN LOAD ⩾ 110%

△ (W) REPLACES LOAD INDICATION WHEN APU MASTER SW IS IN OFF POSITION

2 - APU GEN (W)

(A) WHEN APU GEN P/B SWITCH IS SELECTED OFF/R AND APU MASTER SW IS IN ON POSITION

3 - APU GENERATOR VOLTAGE (G)

(A) WHEN VOLTAGE ⩽ 110V
⩾ 120V
OFF (W) REPLACES VOLTAGE INDICATION WHEN APU GEN P/B SWITCH IS SELECTED OFF/R
NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION

4 - APU GENERATOR FREQUENCY (G)

(A) WHEN FREQUENCY ⩽ 390 HZ
⩾ 416 HZ
NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION OR APU GEN P/B SWITCH IS SELECTED OFF/R

5 - APU BLEED PRESSURE (G)

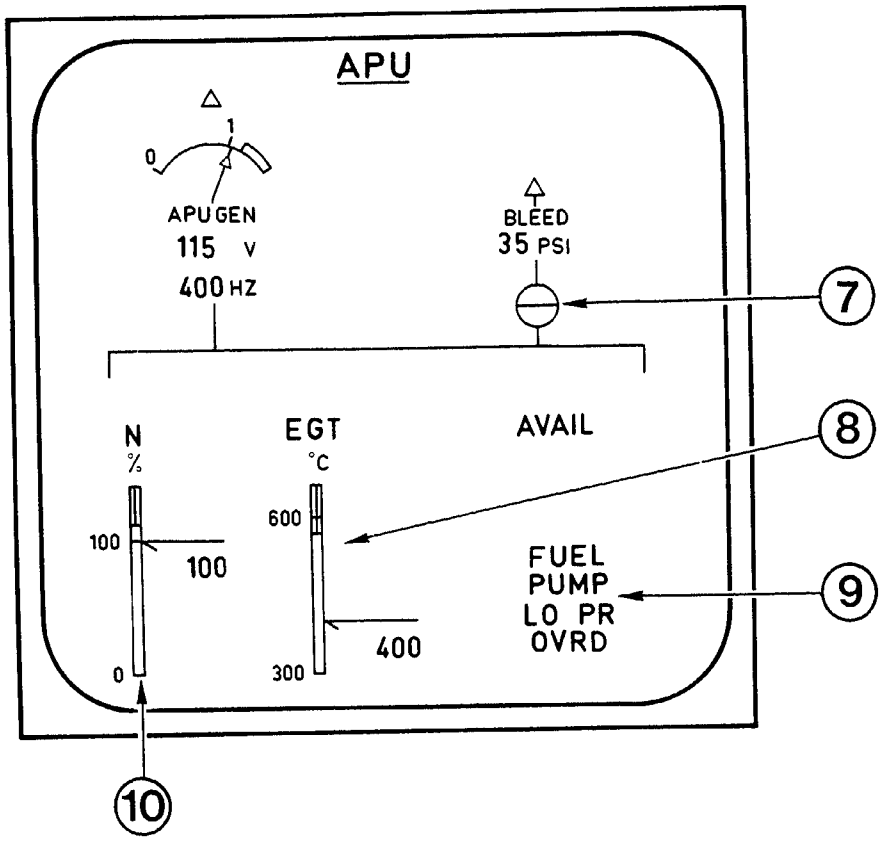
(A) WHEN PRESSURE ⩾ 57 PSI

NOT DISPLAYED WHEN BLEED VALVE CLOSED
XX(A) IF POWER SUPPLY LOSS FOR CONTROLLER INDICATOR

6 - AVAIL (NOT DISPLAYED)
AVAIL (C) WHEN ⩾ 95% AND APU MASTER SW IS IN ON POSITION

BM5 31 51 00 0 AGB1 25 20
DM5

APU System Display (1/2)
Figure 057



7 - APU BLEED VALVE

(G) . VALVE FULLY OPEN

(G) VALVE CLOSED (NOT FULLY OPEN)

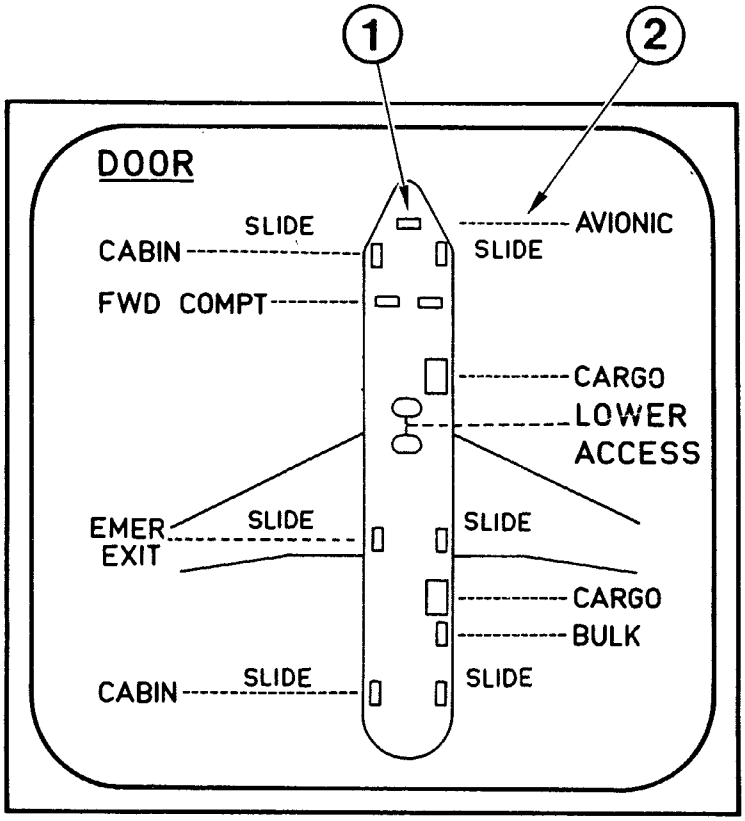
8 - APU EXHAUST GAS TEMPERATURE (G)
FLASHES WHEN EGT ⩾ 540°C.
(A) WHEN EGT ⩾ 585°C

9 - FUEL PUMP (W) WHEN LO PRESS OR OVRD
LO PR (A) WHEN FUEL LO PRESS
OVRD (G) WHEN FUEL PUMP SW IS SELECTED IN OVERRIDE POSITION
NOT DISPLAYED IN NORMAL OPERATION

10 - APU RPM (G)
(A) WHEN N ⩾ 107 %

BM5 31 51 00 0 AGC0 —09—04
DM5

APU System Display (2/2)
Figure 058



1 - (G) (W) AVIONIC (W) : DOOR LOCKED
(A) (A) AVIONIC (A) : DOOR NOT LOCKED

2. SLIDE (W) : WHEN CABIN SLIDE ARM
NOTHING DISPLAYED WHEN CABIN SLIDE DISARM.

BM5 31 51 00 0 AGHO - 10

DOOR System Display
Figure 059

EFFECTIVITY: 001-100,

R

PIA

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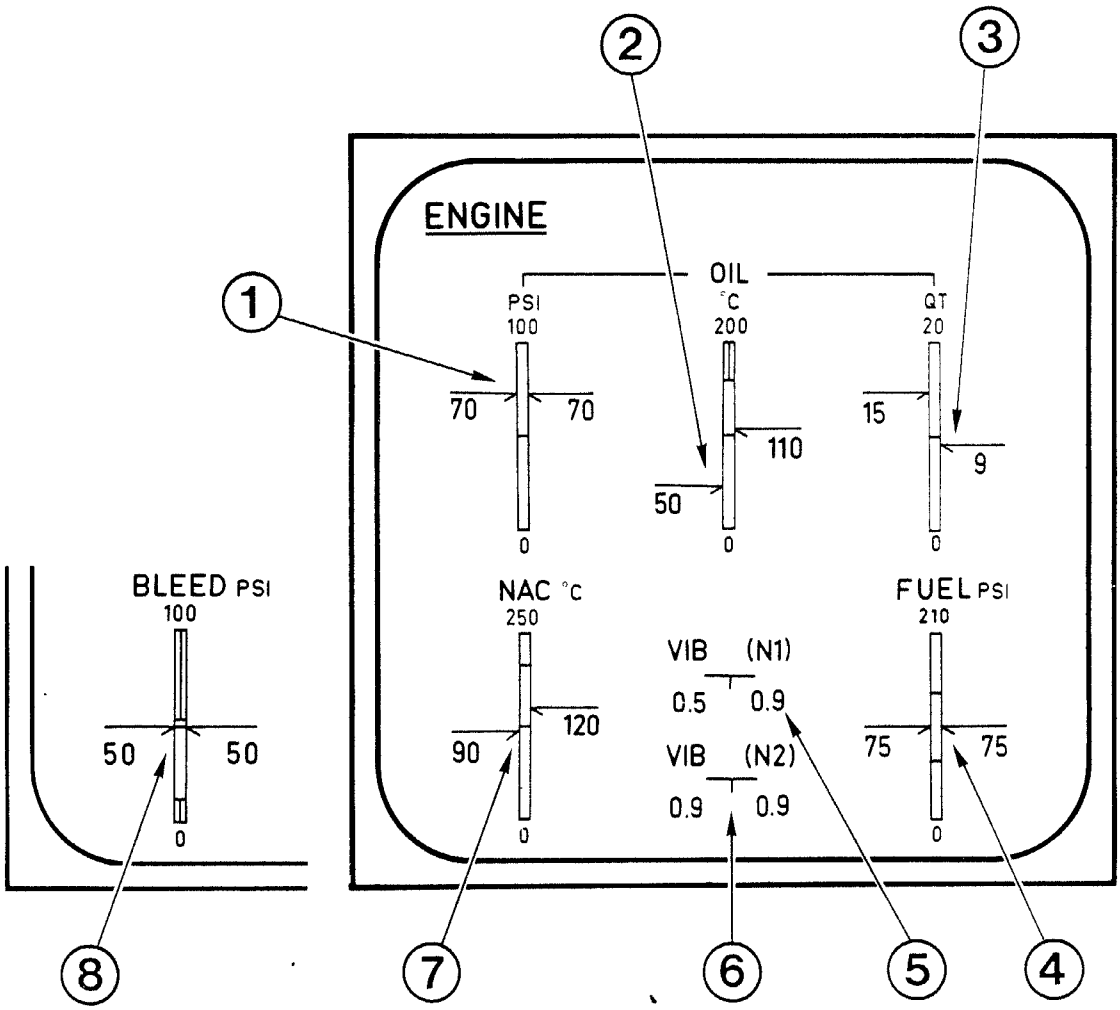


1 - OIL PRESSURE (G)
FLASHES WHEN P ≥ 90 PSI OR P ≤ 16 PSI
(R) WHEN P ≤ 10 PSI
XX(A) IF POWER SUPPLY LOSS
FOR CONTROLLER INDICATOR

2 - OIL TEMPERATURE (G)
FLASHES WHEN t ≥ 160°C
(A) WHEN t ≥ 175°C

3 - OIL QUANTITY (G)
FLASHES WHEN QUANTITY ≤ 2 QTS
XX(A) IF POWER SUPPLY LOSS
FOR CONTROLLER INDICATOR

4 - FUEL PRESSURE (G)
FLASHES WHEN PRESSURE ≤ 50 PSI
(ONLY IN FLIGHT WITH BOTH ENG)

5 - ENGINE VIBRATION (N1) (G)
FLASHES WHEN VIBRATION ≥ 3 UNITS

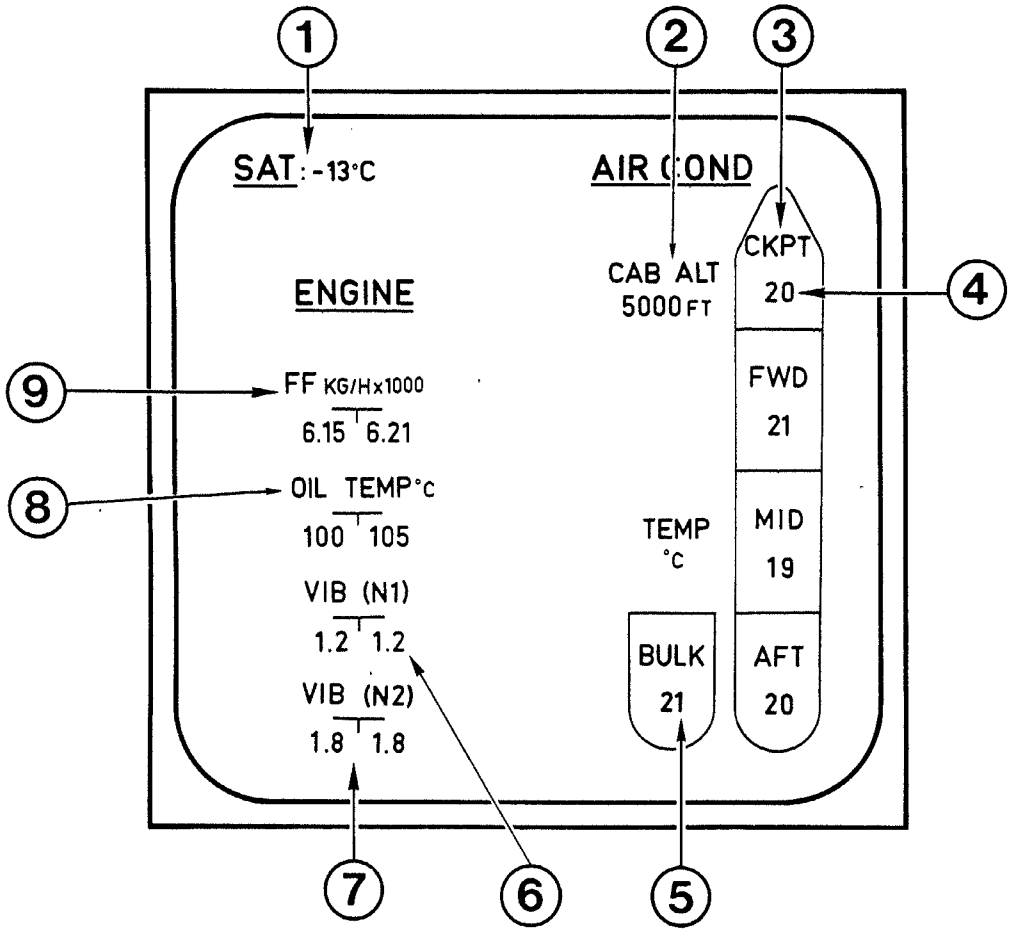
6 - ENGINE VIBRATION (N2) (G)
FLASHES WHEN VIBRATION ≥ 5 UNITS

7 - NACELLE TEMPERATURE (G)
FLASHES WHEN t ≥ 185°C + TAT
NOT DISPLAYED DURING STARTING SEQUENCE
(REPLACED BY BLEED PRESSURE INDICATION)

8 - BLEED PRESSURE (G)
(A) WHEN PRESSURE ≤ 8 PSI
≥ 57 PSI
DISPLAYED DURING STARTING SEQUENCE
* IF TAT (ADC BUS) NOT AVAILABLE
THIS ADVISORY WILL BE SUPPRESSED
XX(A) IF POWER SUPPLY LOSS
FOR CONTROLLER INDICATOR

BM5 31 51 00 0 AGQ1 00

ENGINE System Display
Figure 060



1 - STATIC AIR TEMPERATURE (G)

2 - CABIN ALTITUDE (G)
(R) WHEN ALTITUDE ≥ 10000 Ft

3 - COMPARTMENT IDENTIFIER (W)
(A) WHEN DUCT t° ≥ 88°C

4 - COMPARTMENT TEMPERATURE (G)

5 - CARGO COMPARTMENT TEMPERATURE (G)
FLASHES WHEN t° > 33°C

6 - ENGINE VIBRATION N1 (G)
FLASHES WHEN VIBRATION ≥ 3 UNITS

7 - ENGINE VIBRATION N2 (G)
FLASHES WHEN VIBRATION ≥ 5 UNITS

8 - OIL TEMPERATURE (G)
FLASHES WHEN t° ≥ 160°C
(A) WHEN t° ≥ 175°C

9 - FUEL FLOW (G)
XX(A) IF POWER SUPPLY LOSS
FOR CONTROLLER INDICATOR

BM5 31 51 00 0 AHB1-28-23
DM5

CRUISE System Display
Figure 061

(3)System display operational mode

Four modes of operation are provided for the system pages defined hereupon.

Three modes are automatic, one is manual.

(a)Automatic mode related to a failure

As soon as a warning is detected by the FWC, the R ECAM display unit automatically shows the relevant system page (if any) associated with the first message displayed on the L ECAM display unit.

This mode allows the crew to cross-check on the system display the part of system no longer usable and to follow the result of corrective action.

(b)Automatic advisory mode (in flight only)

NOTE : All advisories are inhibited at anytime on ground and until slat retraction after take off.

When a parameter drifts out of normal range the relevant system page is automatically displayed on the R ECAM display unit to attract crew attention well before reaching the warning level.

When an advisory situation occurs, the mention ADV is written in white beside the title (flashing).

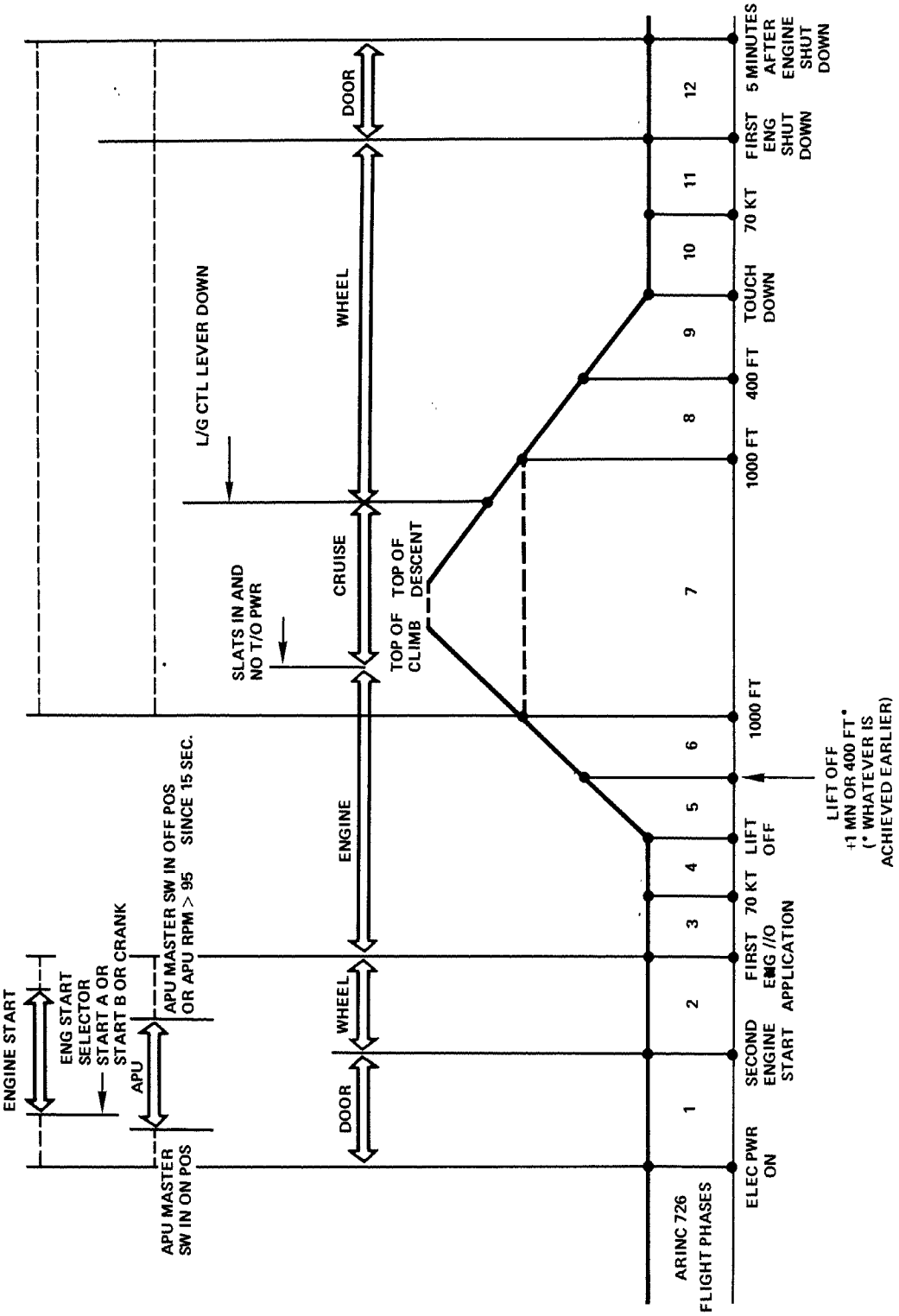
The parameter which triggers the advisory mode is pulsing smoothly.

- Parameters monitored by the advisory mode :

	ATA	PARAMETER
	21	TURBINE INLET TEMP ≥ 95°C AND ≤ 120°C
		CARGO COMPT TEMP > 33°C
R		CAB PRESS ≥ 8.6 psi NO ADVISORY IN AMBER RANGE AND RED RANGE
R		VERTICAL SPEED ≥ V/S SELECTED + 50% NO ADVISORY IN AMBER
R		RANGE AND RED RANGE
R		FWD VALVE POSITION ≠ AFT VALVE POSITION +40% NO ADVISORY
R		IN AMBER RANGE AND RED RANGE
R	24	IDG OUTLET TEMP ≥ 142°C AMBER RANGE WHEN ≥ 185°C
		T.R CURRENT ≤ 6A
	27	WHEN A/C IS ON GROUND ANY SPOILER OUT AND NOT FAILED, ARROW
		IS FLASHING AS FOR AN ADVISORY MODE IF WHEEL SPEED ≥ 70Kt
	28	FUEL UNBALANCED ≥ 3000 Kg
	49	EGT ≥ 540°C AMBER RANGE WHEN ≥ 585°C
	77	OIL QTY ≤ 2 QTS
		OIL TEMP ≥ 160°C AMBER RANGE WHEN ≥ 175°C
		NAC TEMP ≥ 185°C + TAT
		NAC HEAT ≥ 55%, AMBER RANGE WHEN ≥ 90%
		N1 VIB ≥ 3 U
		N2 VIB ≥ 5 U
		OIL PRESS ≤ 16 psi, ≥ 90 psi RED RANGE WHEN P ≤ 10 psi
		FUEL PRESS ≤ 50 psi

(c)Manual mode
The R ECAM display unit shows the system page selected by the crew on the ECAM control panel. This mode enables to select the system pages listed in sub-para L. (2)(c) except the cruise page.
(d)Automatic mode related to the flight phase
This mode is engaged only when the other modes are not engaged. The R ECAM display unit automatically shows the system page related to the present flight phase. (Ref. Fig. 062)

(4)Modes priority
(a)Mode 1 - Automatic mode related to a failure
This mode has priority over all the others but can be superseded if a system page is called manually. It is disengaged if the warning message is cleared by means of the CLR P/B switch or if the failure conditions have disappeared.
(b)Mode 2 - Automatic advisory mode
This mode has priority over modes 3 and 4. It is disengaged if the corresponding system P/B switch is pressed or if another system is called manually.
A system page displayed in advisory mode and disengaged can only be called again in advisory mode if the parameter monitored goes below then above its advisory level. Disengagement is automatic when a warning occurs or when the parameter is back to normal.
(c)Mode 3 - Manual mode
This mode can be engaged at any time but is disengaged if mode 1 or 2 is engaged.
(d)Mode 4 - Automatic mode related to the flight phase
This mode is automatically engaged if the other modes are not engaged.



BM5 31 51 00 0 AHH0 23 18
DM5

Automatic Mode Related to the Flight Phase
Figure 062

6. Operational Rules

A. Use of the ECAM System
(1)Preflight
- check :
both SGUs.....ON
FAULT and OFF legends.....OFF
Mode and System P/B SW LTS and legends.....OFF
- adjust display units brightness
(2)In flight
(a)Without aircraft system failure

**ON A/C 001-004, 006-100,

- Automatic mode related to the flight phase
(Ref. Fig. 031)

**ON A/C 005-005,

- Automatic mode related to the flight phase
(Ref. Fig. 032)

**ON A/C 001-004, 006-100,

- Manual mode
(Ref. Fig. 033)
- Automatic advisory mode
(Ref. Fig. 035)

**ON A/C 005-005,

- Manual mode
(Ref. Fig. 034)
- Automatic advisory mode
(Ref. Fig. 036)

**ON A/C 001-004, 006-100,

(b)With an independent aircraft system failure
(Ref. Fig. 063, 064, 065)
(Ref. Fig. 030, 037, 066)

**ON A/C 005-005,

(b)With an independent aircraft system failure
(Ref. Fig. 063, 064, 065)
(Ref. Fig. 030, 038, 066)

**ON A/C 001-004, 006-100,

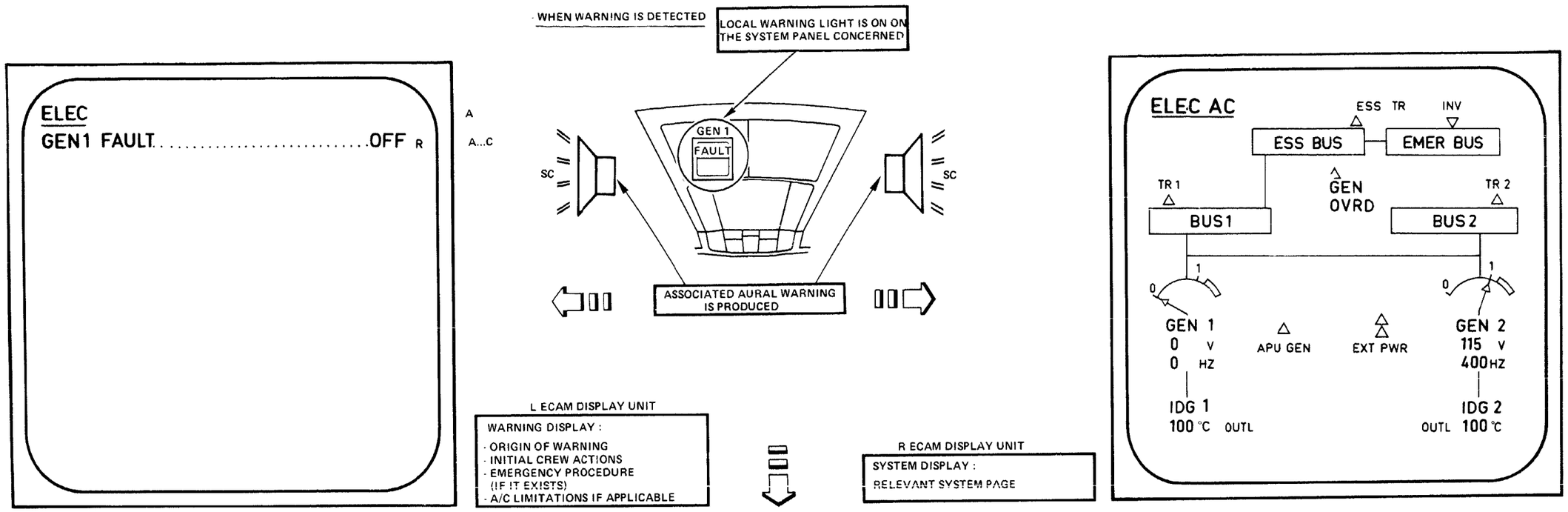
(c)With a primary aircraft system failure

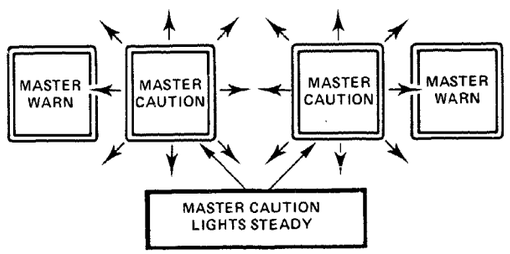
(Ref. Fig. 021, 022, 023)
(Ref. Fig. 024, 025, 026)
(Ref. Fig. 027, 029)

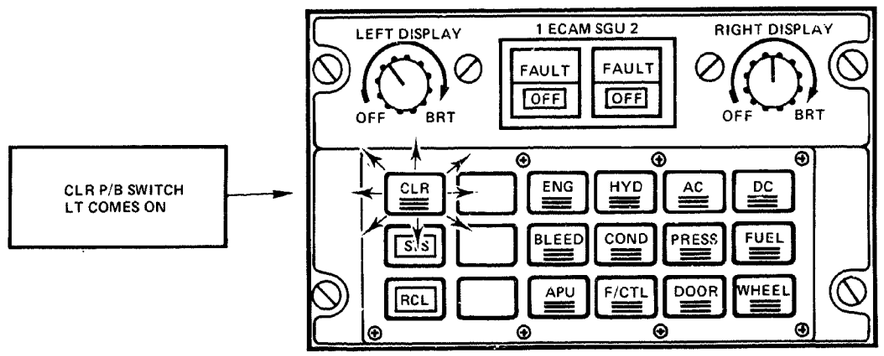
**ON A/C 005-005,

(c)With a primary aircraft system failure
(Ref. Fig. 021, 022, 023)
(Ref. Fig. 024, 025, 026)
(Ref. Fig. 028, 029)

**ON A/C 001-100,







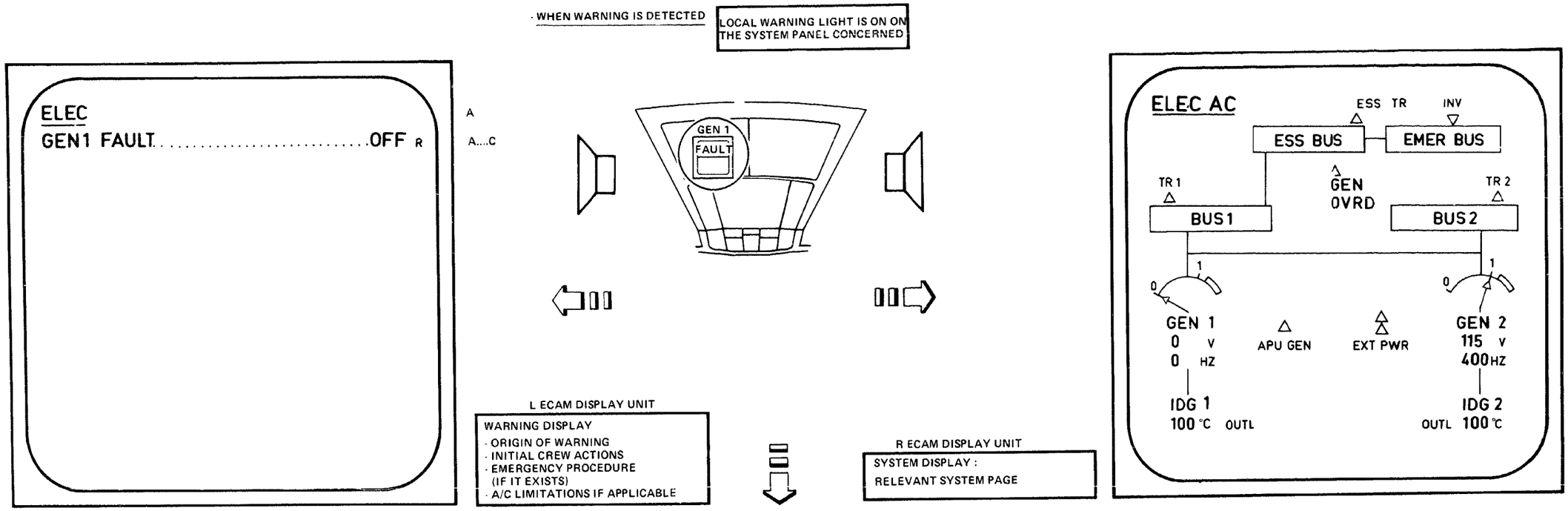
BM5 31 51 00 0 SVZO 14 09
DM5

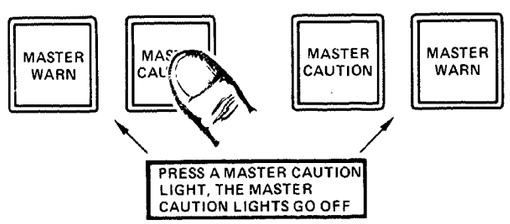
Operation with an Independent Aircraft System
Failure When Warning is Detected
Figure 063

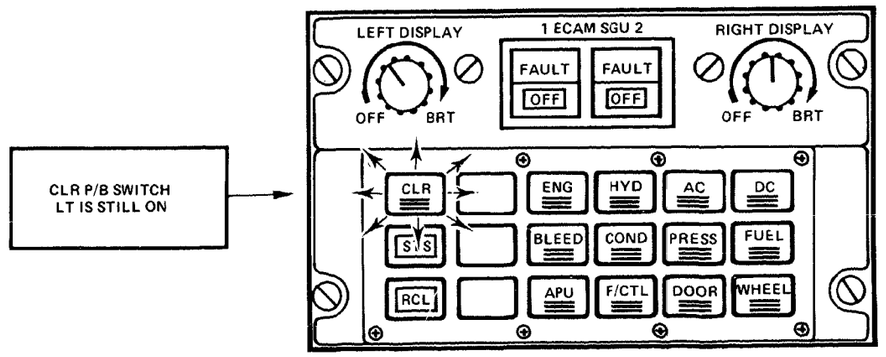
EFFECTIVITY: 001-100,

R

PIA







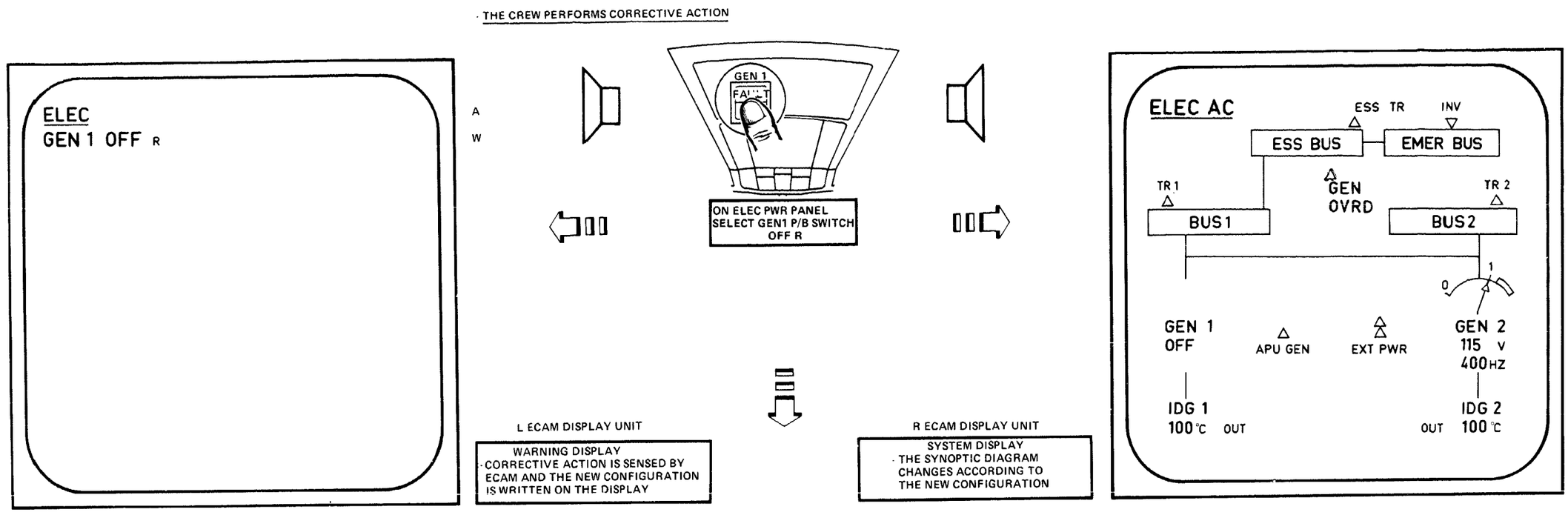
BM5 31 51 00 0 SWCO 14 09
DM5

Operation with an Independent Aircraft System Failure
MASTER CAUTION Lights Extinguishing
Figure 064

EFFECTIVITY: 001-100,

R

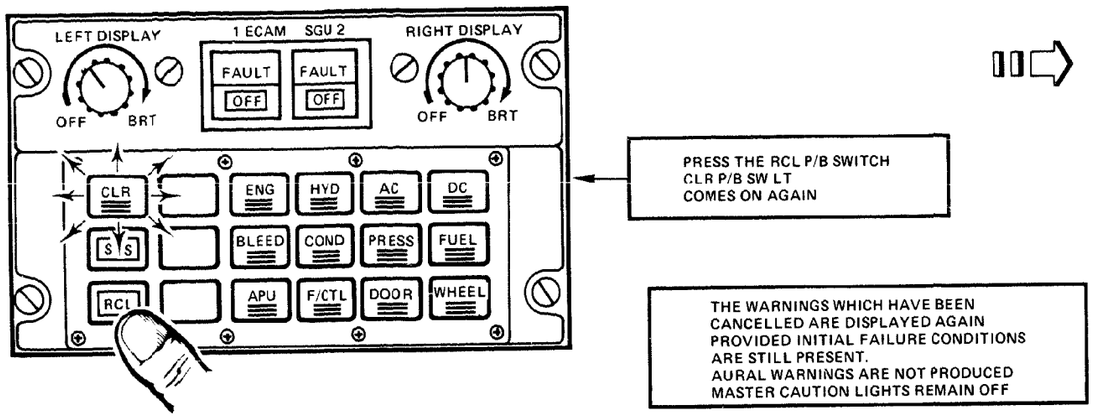
PIA

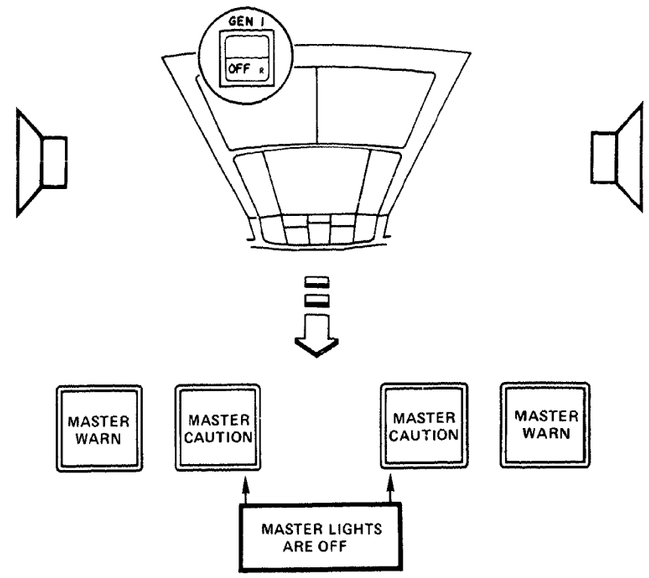


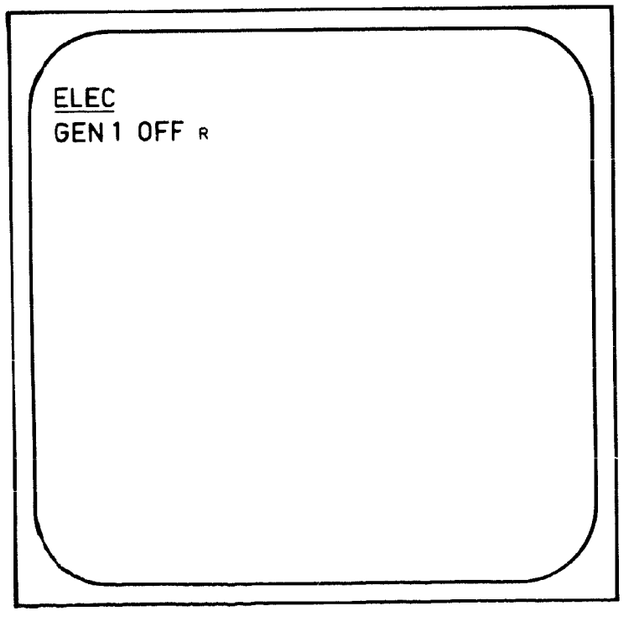
BM5 31 51 00 0 SWFO 14 09
DM5

Operation with an Independent Aircraft System Failure
The Crew Performs Corrective Action
Figure 065

- PLAY BACK OF THE FAILURE SEQUENCE : RECALL

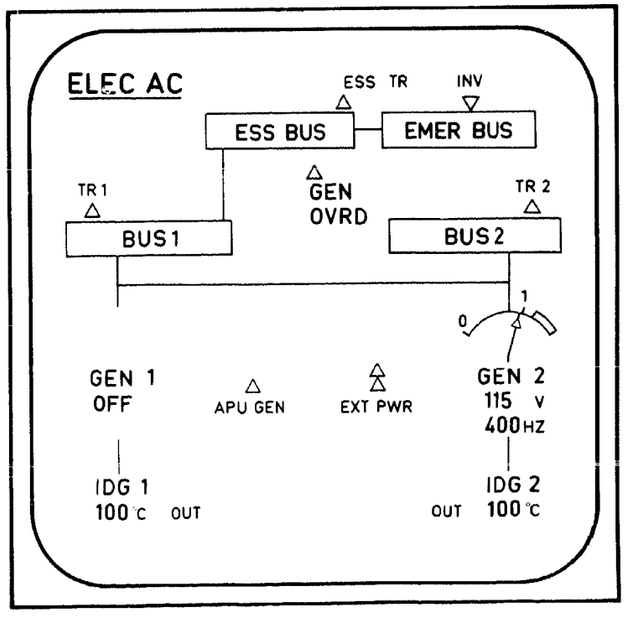






A
W

WARNING DISPLAY



SYSTEM DISPLAY

BM5 31 51 00 0 SWRO 14 09
DM5

Operation with an Independent Aircraft System Failure
Play Back of the Failure Sequence - RECALL
Figure 066

7. Operation in the Event of an ECAM Unit Failure

Operation after failure of one or another unit of the ECAM system has been optimized and the following configurations can be found.

A. FWC 1 or 2 Failure

(Ref. Fig. 067, 068, 069)
(Ref. Fig. 070, 071, 072)
(Ref. Fig. 073, 074, 075)

Level 3 warnings are still processed by the FWC available and presented by the ECAM system.

Half of level 2 and 1 warning inputs are no longer available and the warnings processed lead to a type of failure indication on the L ECAM display unit (Ref. Fig. 015). If processed, status information is presented by the ECAM system.

In this case the systems have to be monitored on the R ECAM display unit and on the overhead and other control panels.

When the FWC failure occurs the MASTER CAUTION lights come on and the L ECAM display unit presents the message :

CRT AMBER CAUTIONS NOT AVAIL
- MONITOR OVERHEAD PANEL

When the warning message is cleared, the L ECAM display unit permanently displays the message FWS AMBER FAULT ... MONITOR SYS at the top of the MEMO page, just above the MEMO title.

B. FWC1 and FWC2 Audio Module Failure

In this case, no aural warnings are available. The L ECAM display unit presents the message : AURAL WARN NOT AVAIL. When this message is cleared by any CLR P/B switch, the L ECAM display unit permanently displays the message FWS AURAL FAULT at the top of the MEMO page, just above the MEMO title.

NOTE : In case of both FWCs failure, the following message appears on the L ECAM display unit above the MEMO title :
FWS FAULT.....MONITOR SYS

INTENTIONALLY BLANK

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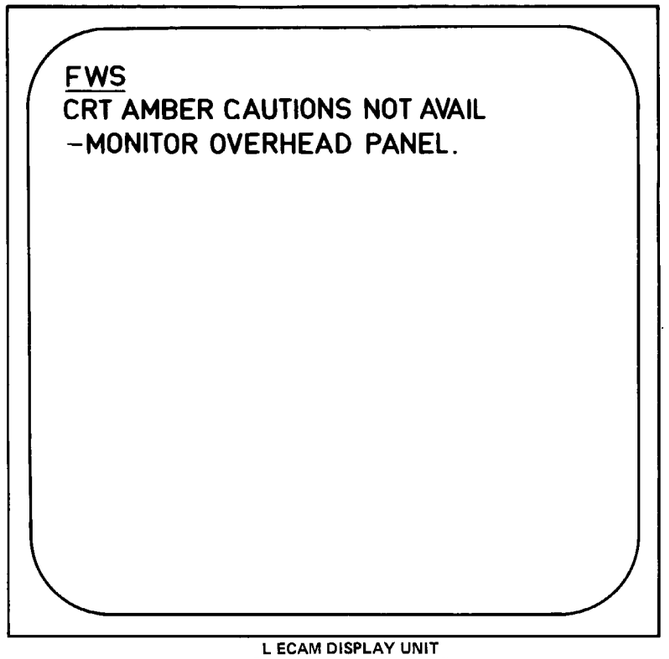
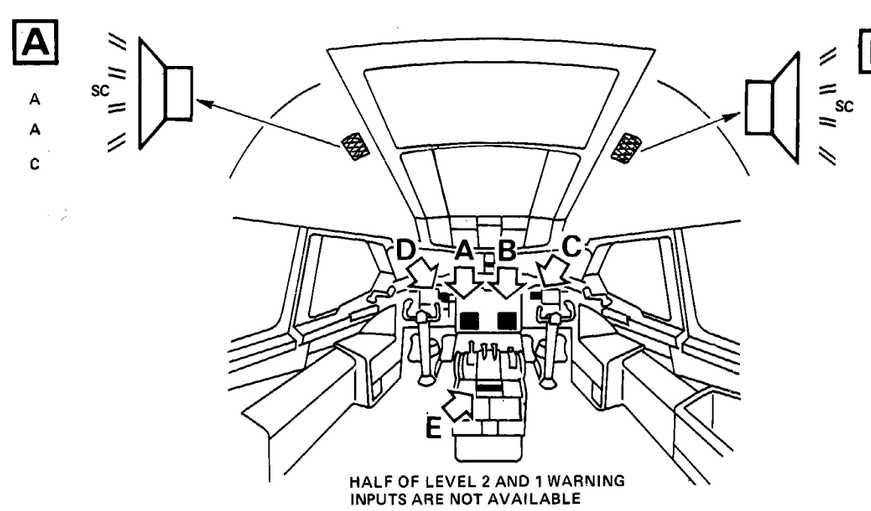
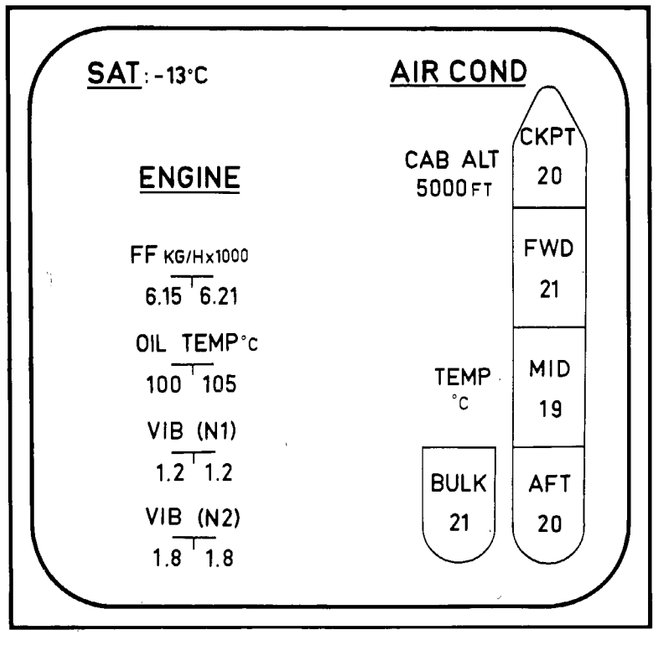
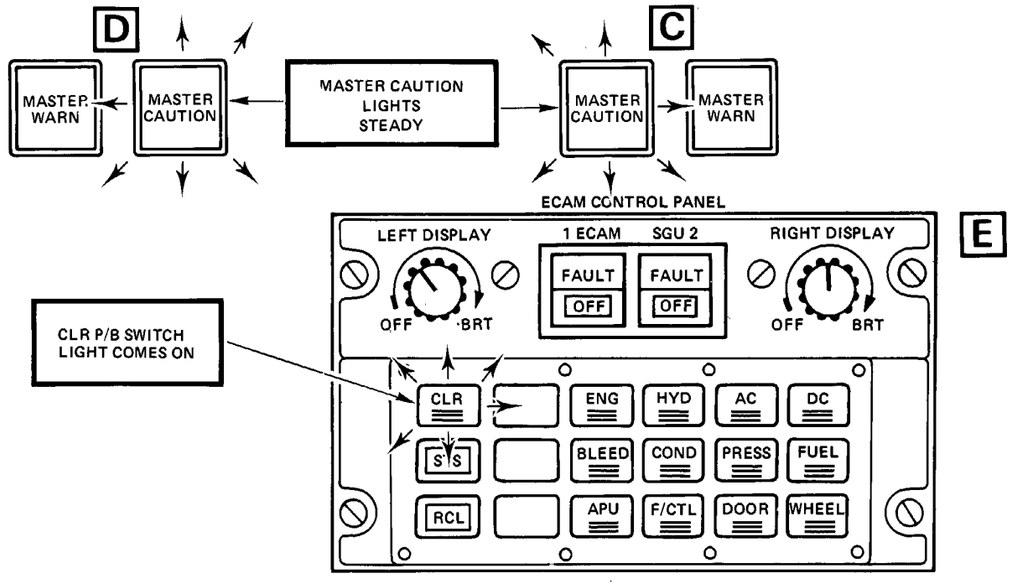


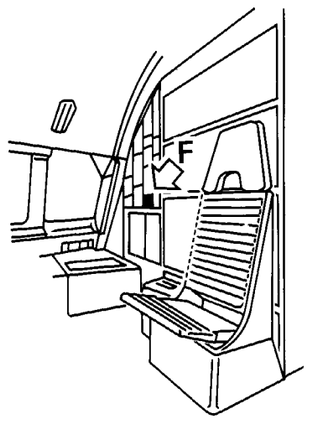
L ECAM DISPLAY UNIT
PRESENTS THE MESSAGE

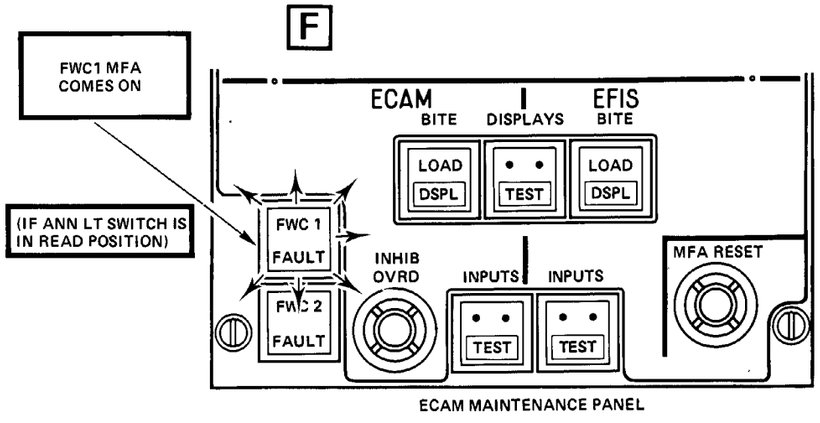


R ECAM DISPLAY UNIT





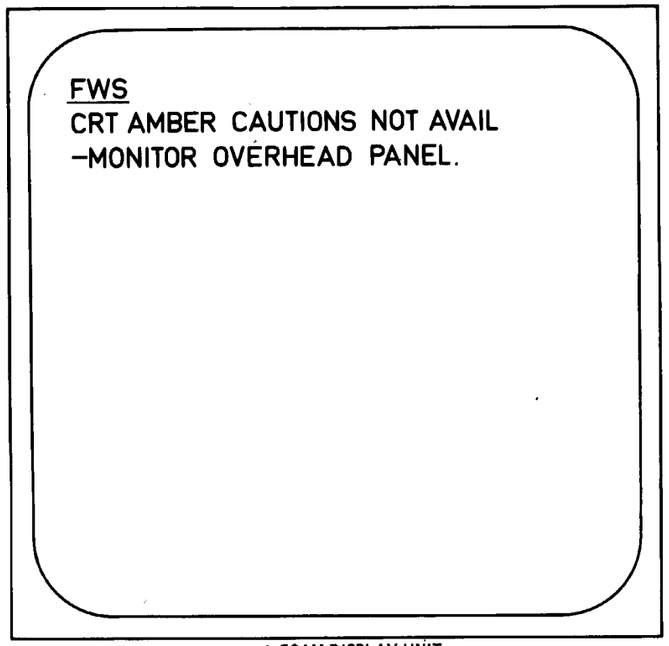




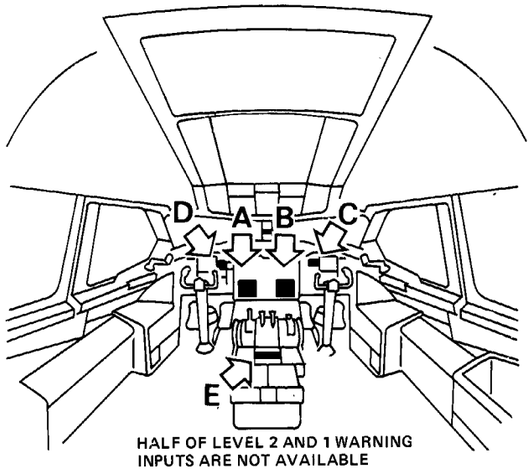
ECAM MAINTENANCE PANEL

BM5 31 51 00 0 SXW2 28

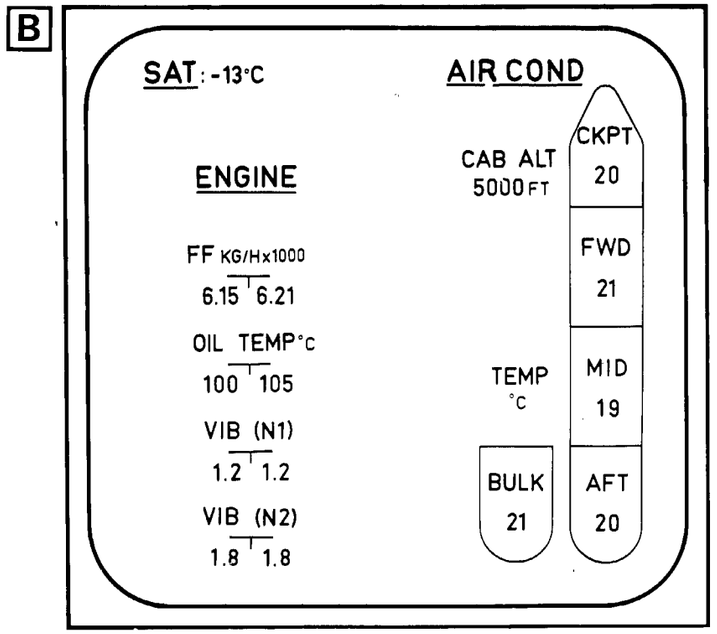
Operation with an FWC Failure when the Warning is Detected
FWC1 Failure
Figure 067



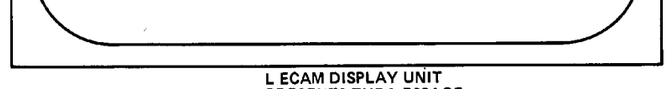
L ECAM DISPLAY UNIT
PRESENTS THE MESSAGE



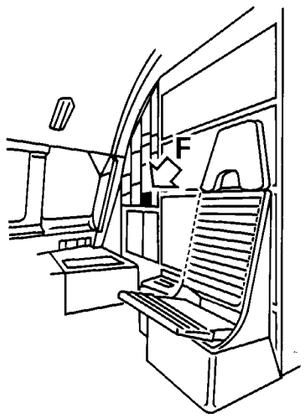
HALF OF LEVEL 2 AND 1 WARNING
INPUTS ARE NOT AVAILABLE



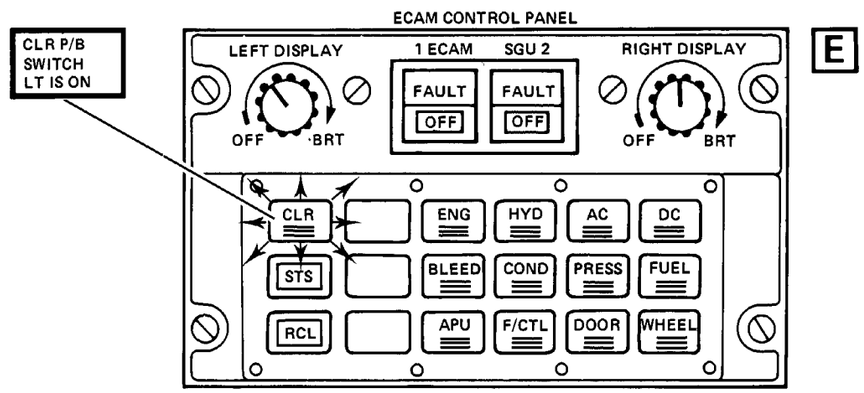
R ECAM DISPLAY UNIT

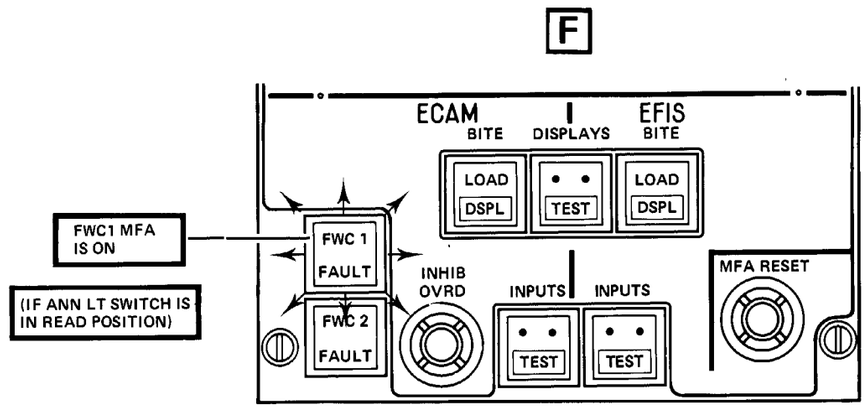


PRESS A MASTER CAUTION
LIGHT, THE MASTER
CAUTION LIGHTS GO OFF



OPERATION WITH A FWC FAILURE
MASTER CAUTION LIGHTS EXTINGUISHING
FWC1 FAILURE



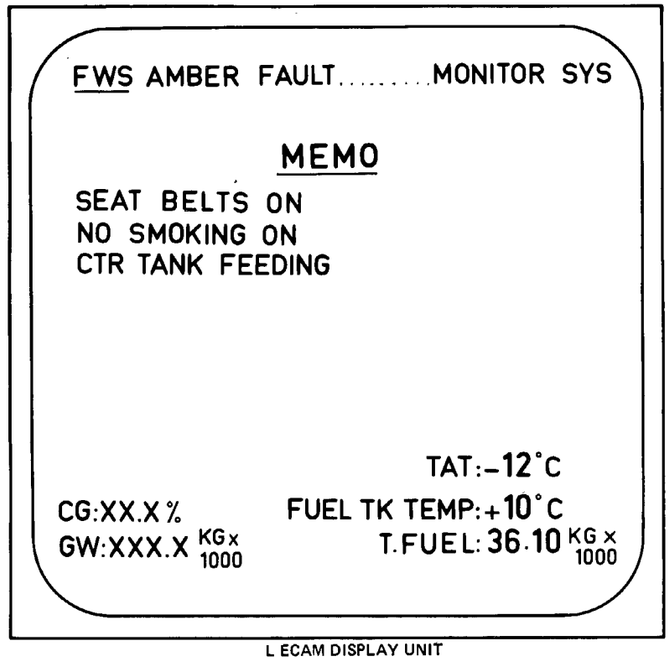


ECAM MAINTENANCE PANEL

BM5 31 51 00 0 SXZ2 28

Operation with an FWC Failure - MASTER CAUTION Lights
Extinguishing - FWC1 Failure
Figure 068

A



L ECAM DISPLAY UNIT
PRESENTS THE MESSAGE

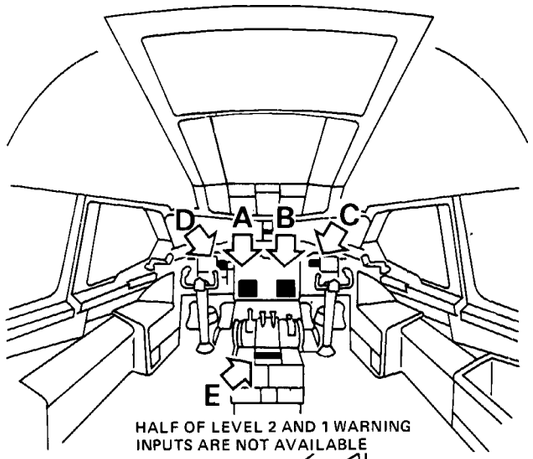
AC

G

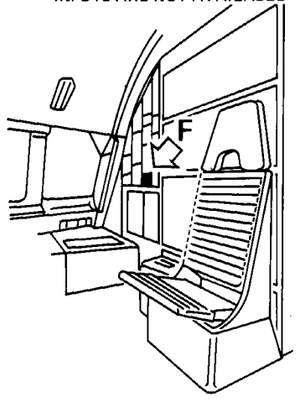
G

G

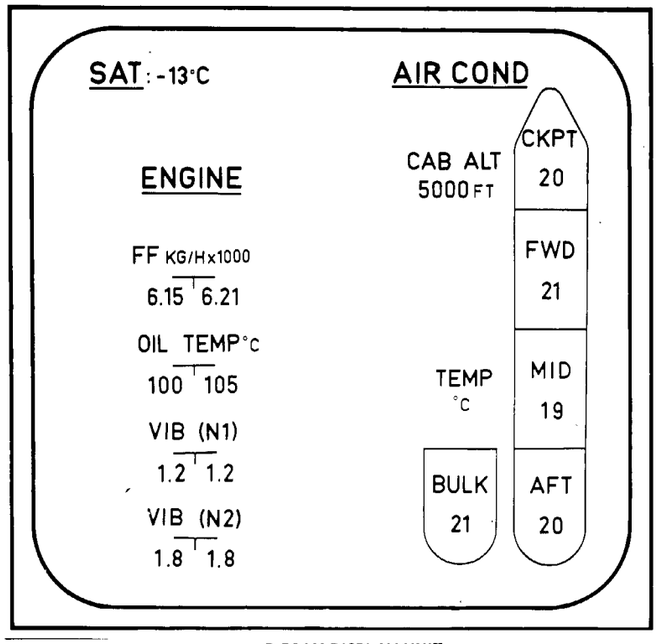
G



HALF OF LEVEL 2 AND 1 WARNING
INPUTS ARE NOT AVAILABLE

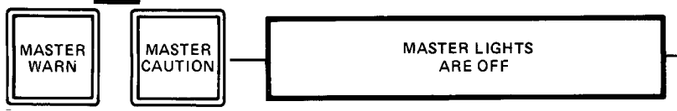


B

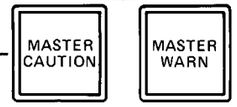


R ECAM DISPLAY UNIT

D

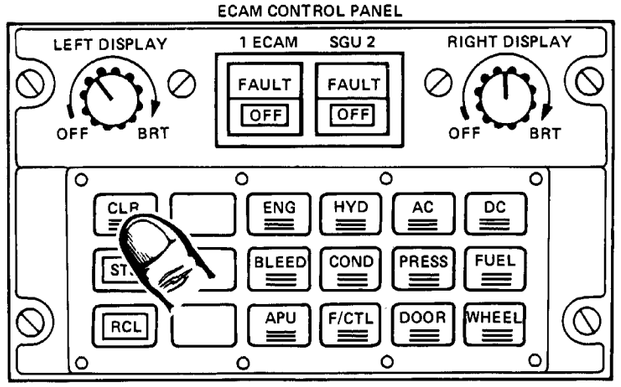


C



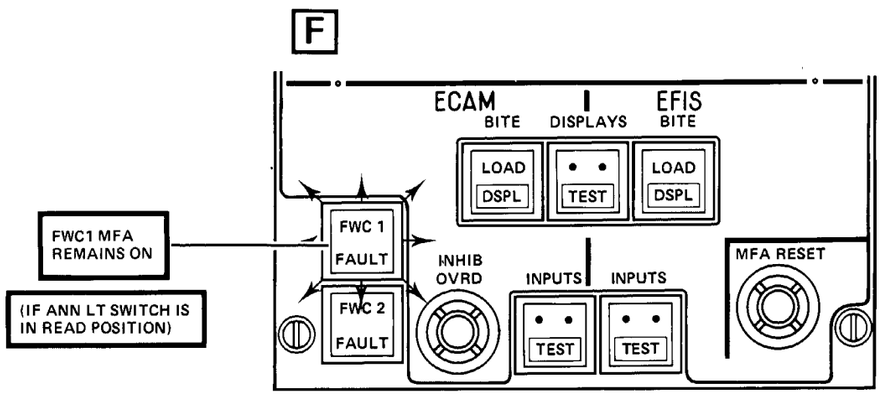
ECAM CONTROL PANEL

E



PRESS THE CLR P/B SWITCH,
CLR LT GOES OFF

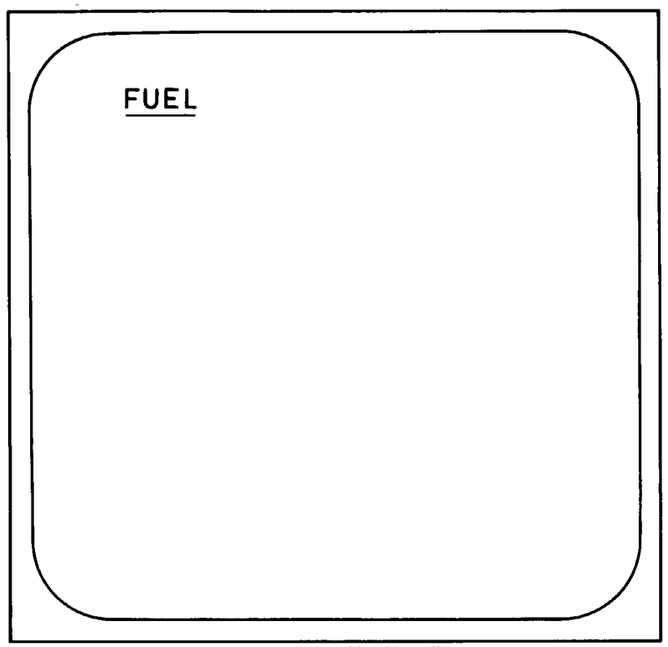
F

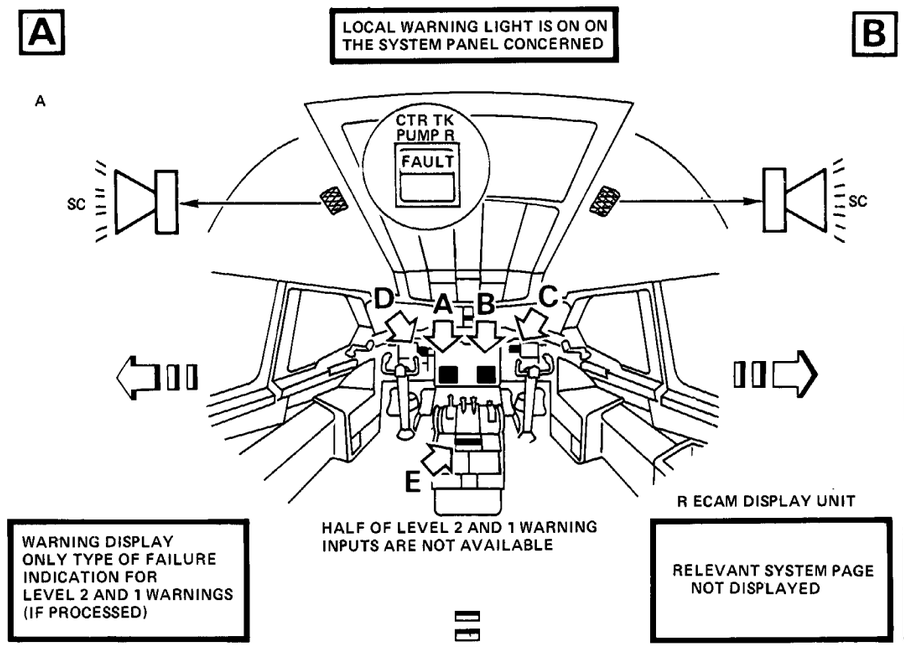


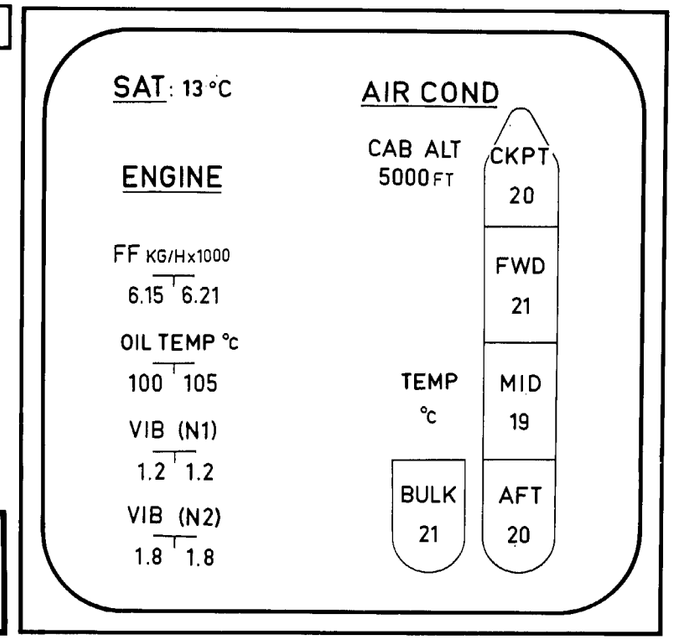
ECAM MAINTENANCE PANEL

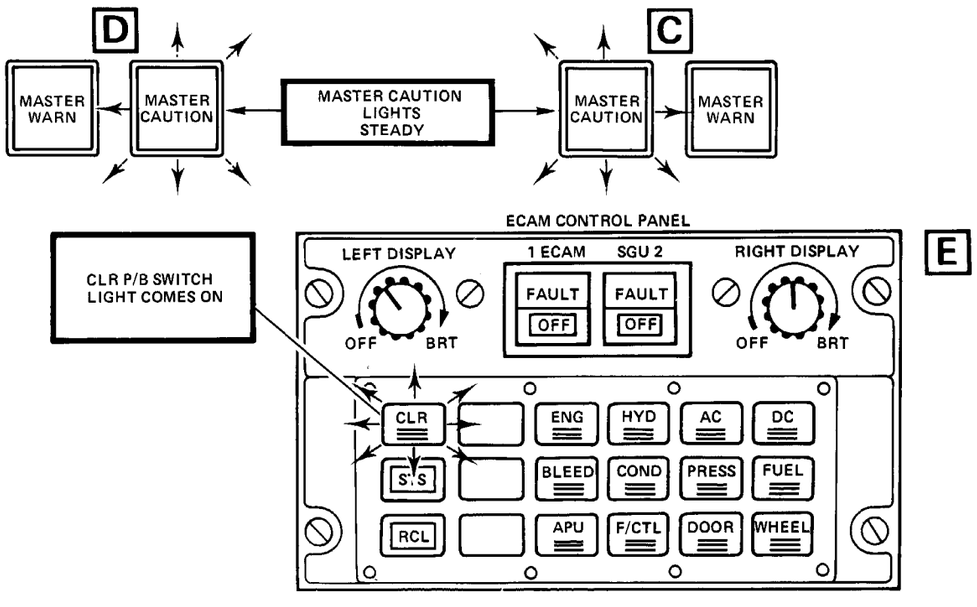
BM5 31 51 00 0 TYD2-28

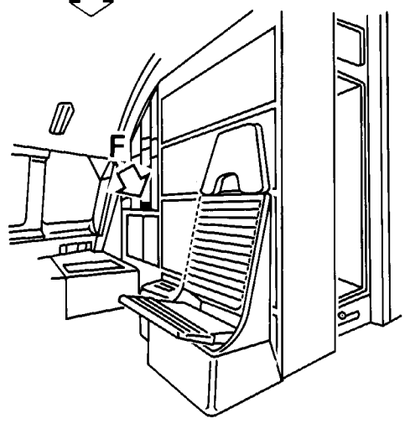
Operation with an FWC Failure - Clearing of the Warning
FWC1 Failure
Figure 069

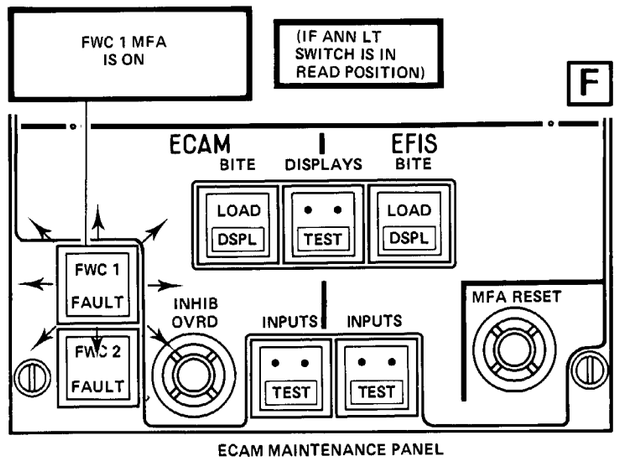












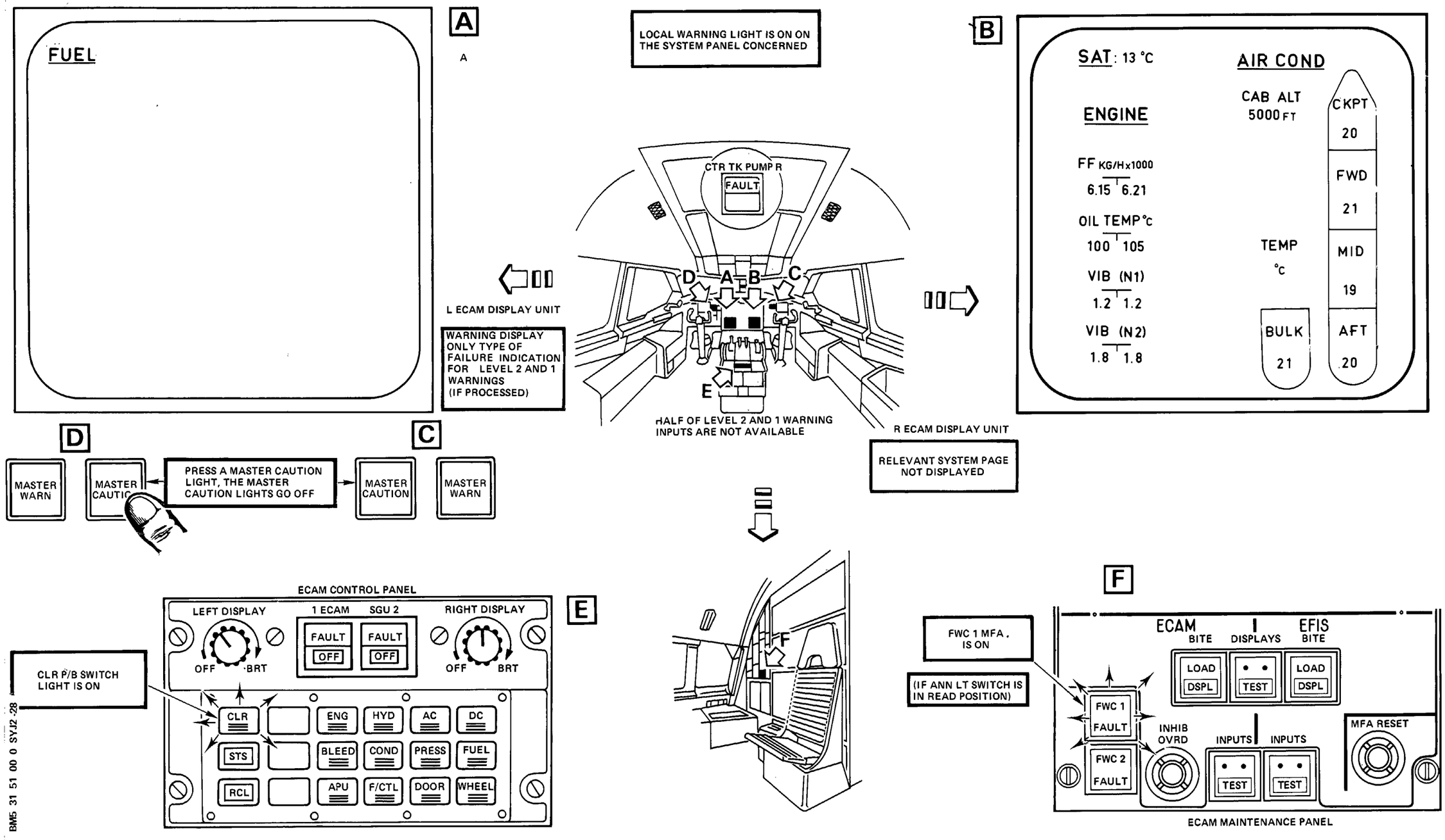
BM5 31 51 00 0 SYF2 28

Operation with an FWC Failure (FWC1) - Center Tank R Pump
LO PR Warning Detected
Figure 070

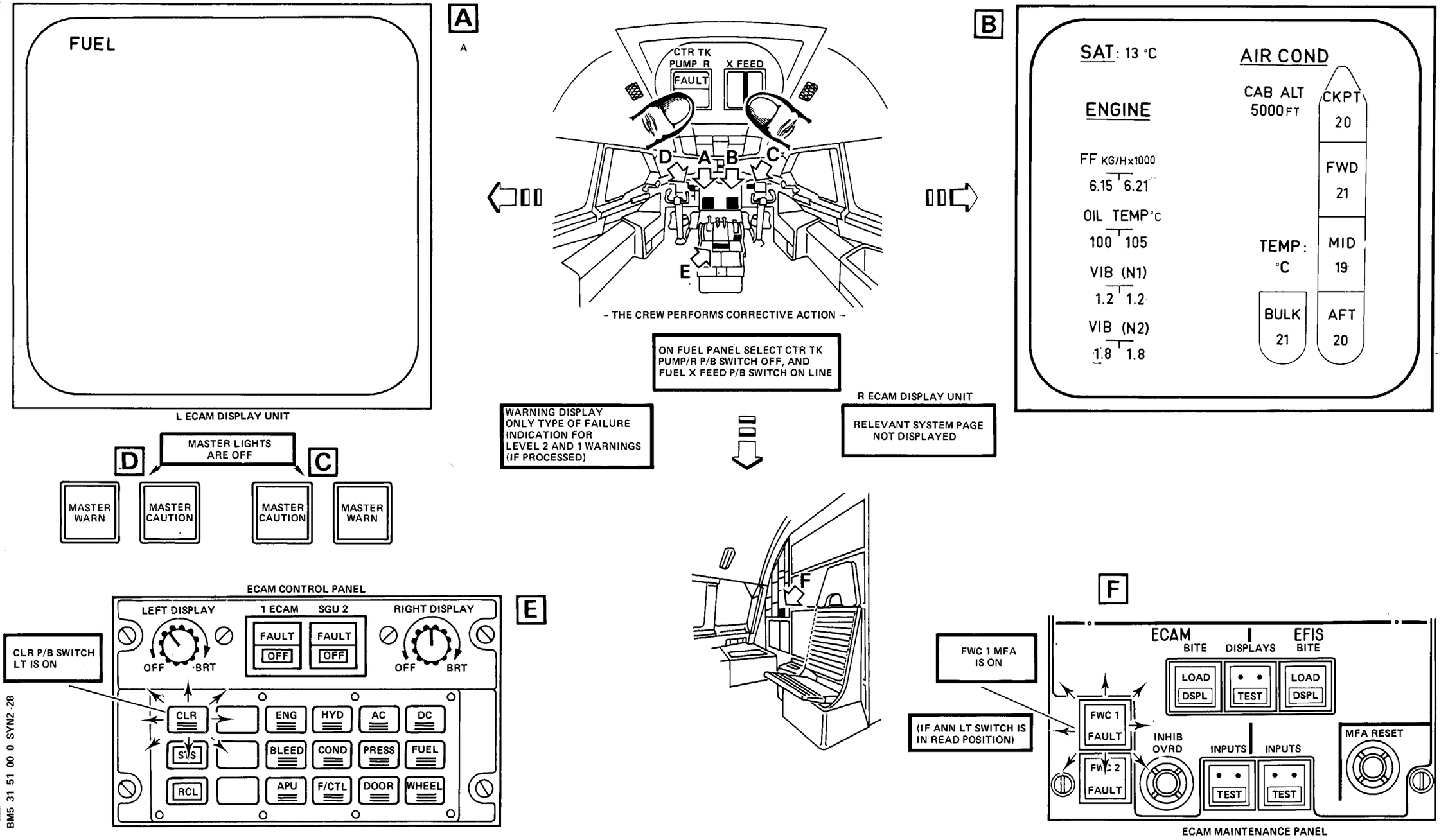
EFFECTIVITY: 001-100,

R

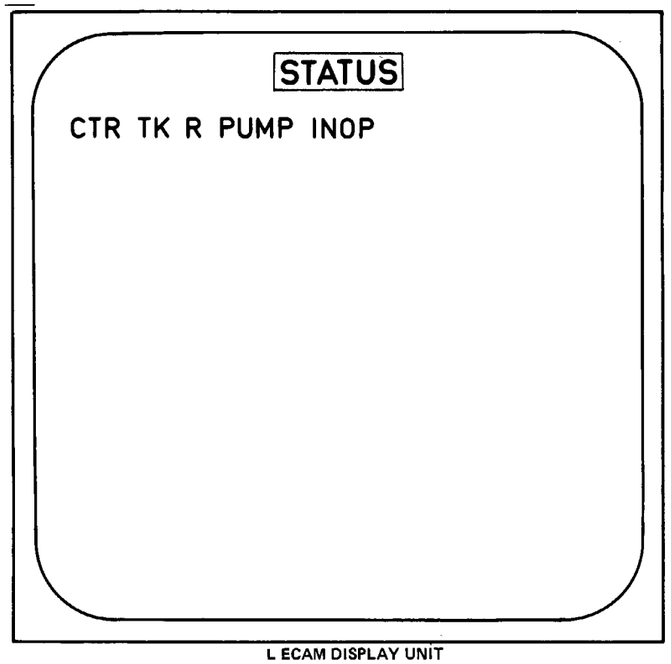
PIA



Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure - MASTER CAUTION Lights Extinguishing
Figure 071



Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure
The Crew Performs Corrective Action (Procedure Indication on Paper)
Figure 072



L ECAM DISPLAY UNIT

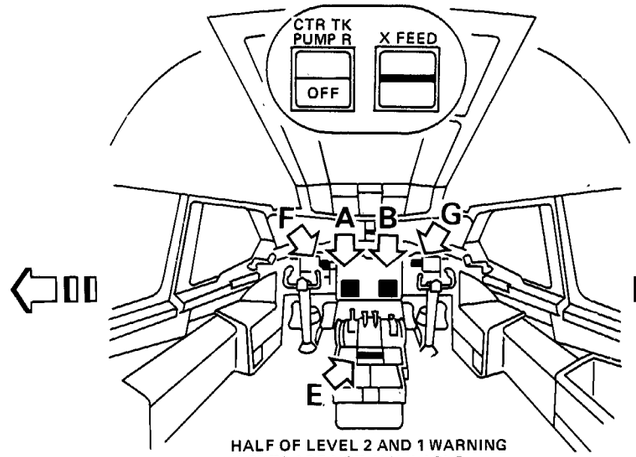
A

G

A

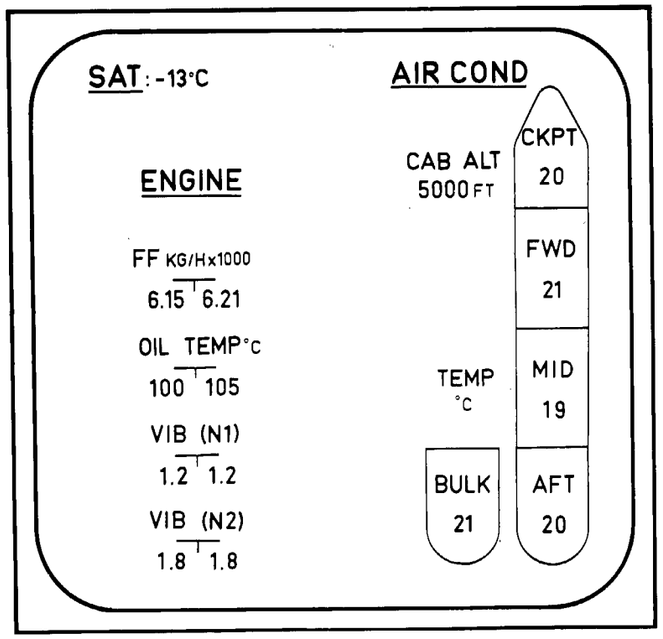
WARNING DISPLAY STATUS PAGE

(STATUS IF PROCESSED)



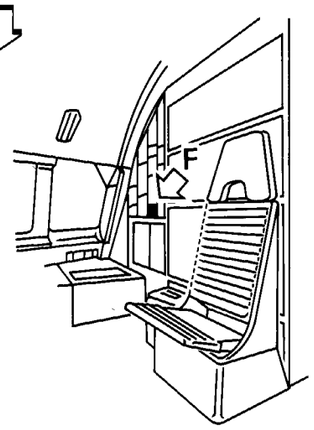
HALF OF LEVEL 2 AND 1 WARNING INPUTS ARE NOT AVAILABLE

B

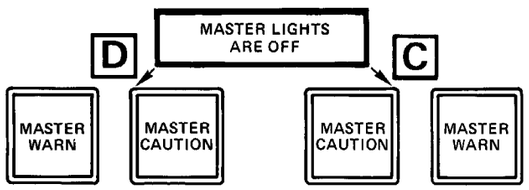


R ECAM DISPLAY UNIT

SYSTEM DISPLAY PAGE RELATED TO THE FLIGHT PHASE



D

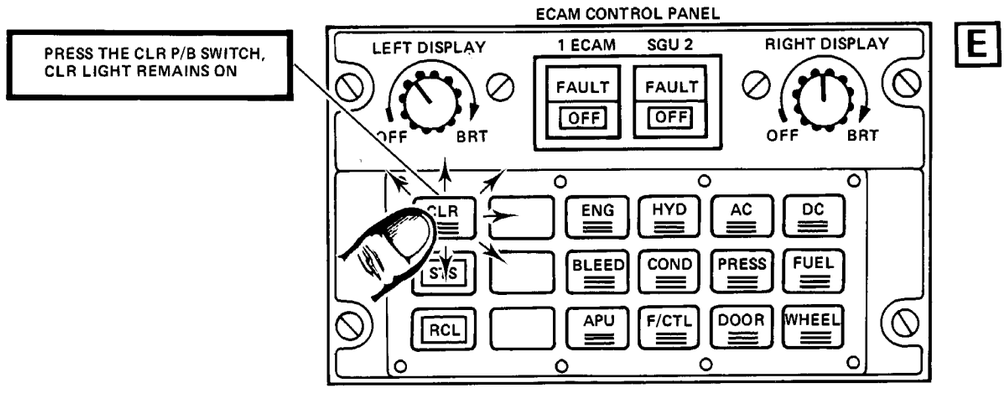


C

ECAM CONTROL PANEL

PRESS THE CLR P/B SWITCH, CLR LIGHT REMAINS ON

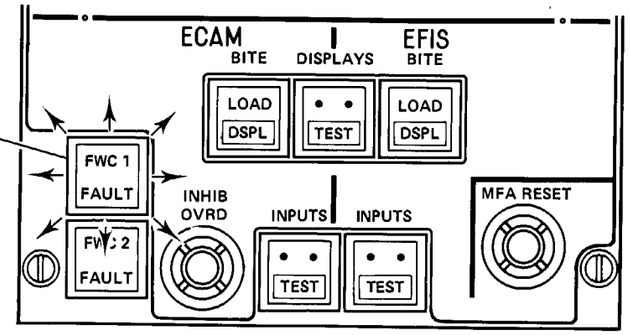
E



FWC1 MFA IS ON

(IF ANN LT SWITCH IS IN READ POSITION)

F



ECAM MAINTENANCE PANEL

BM5 31 51 00 0 SYR2 28

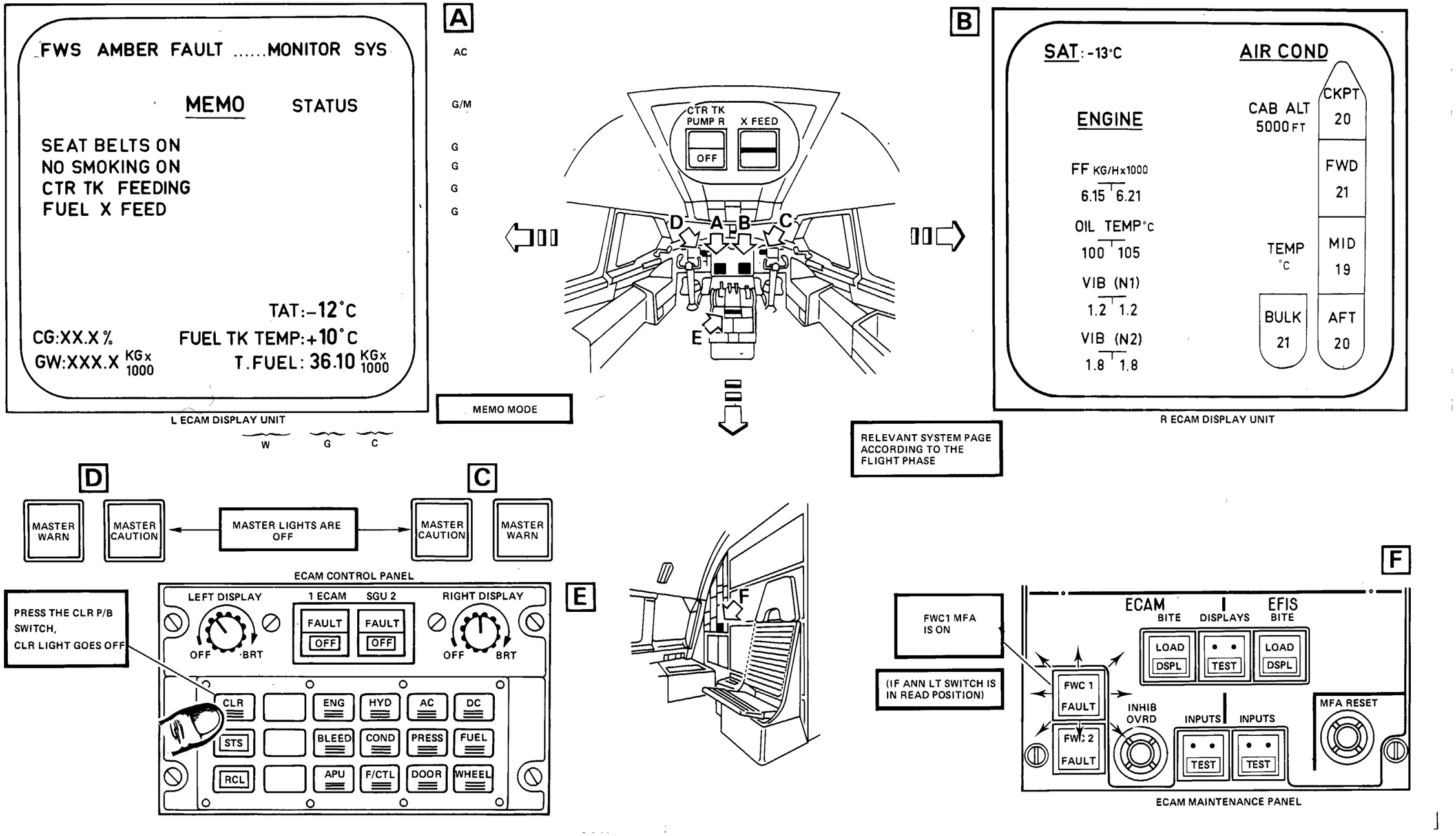
Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure - Clearing of the Independent Failure
Figure 073

EFFECTIVITY: 001-100,

R

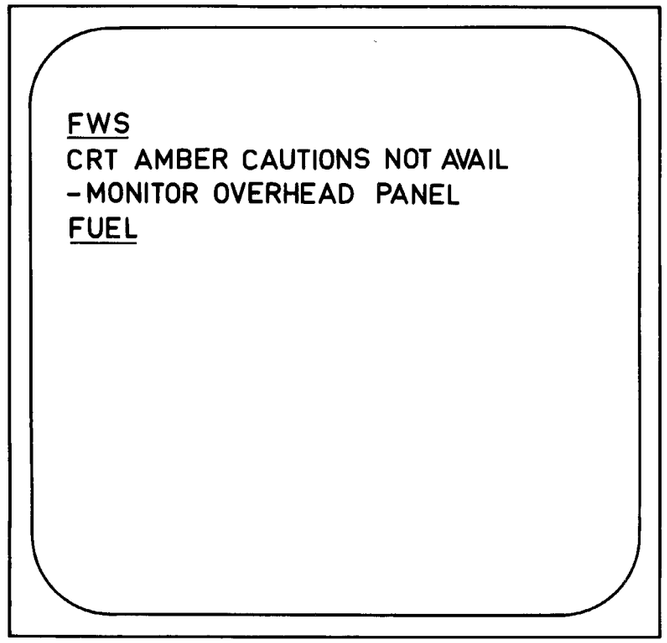
PIA

Printed in France

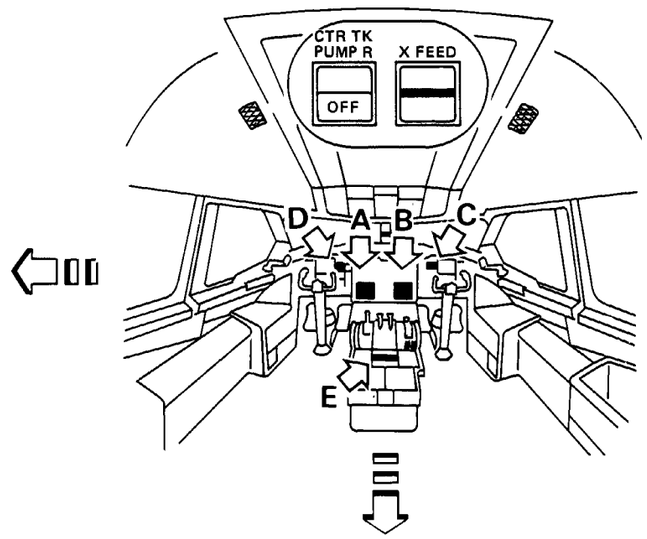


BM5 31 51 00 0 TYW2 28

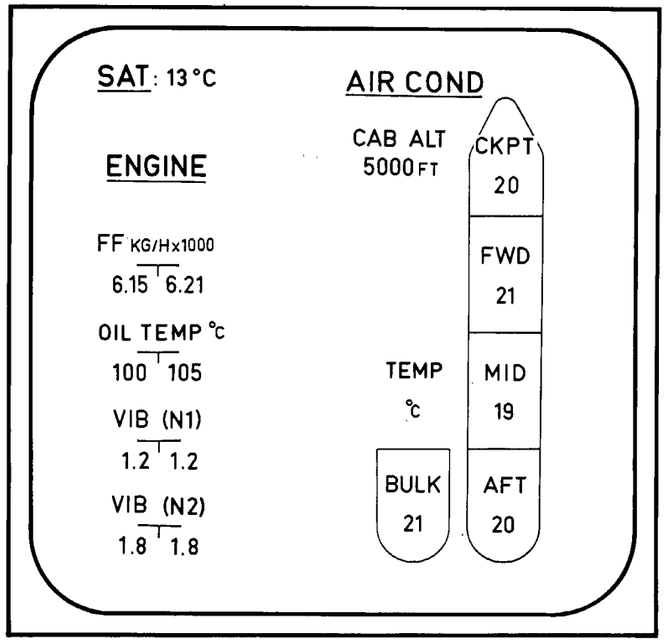
Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure - Clearing of the Status Information
Figure 074

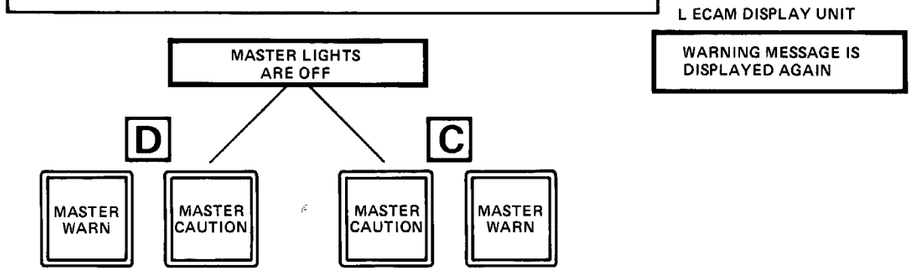


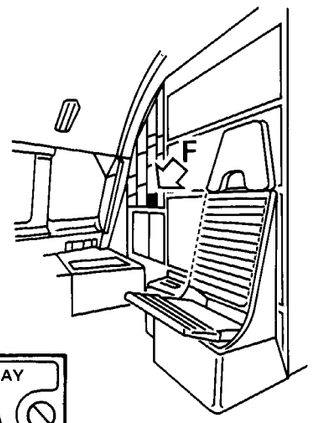
A

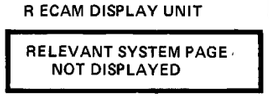


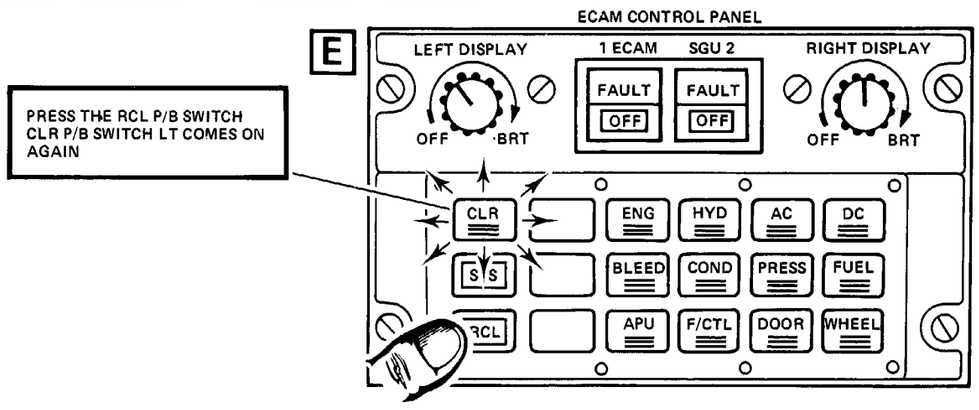
B

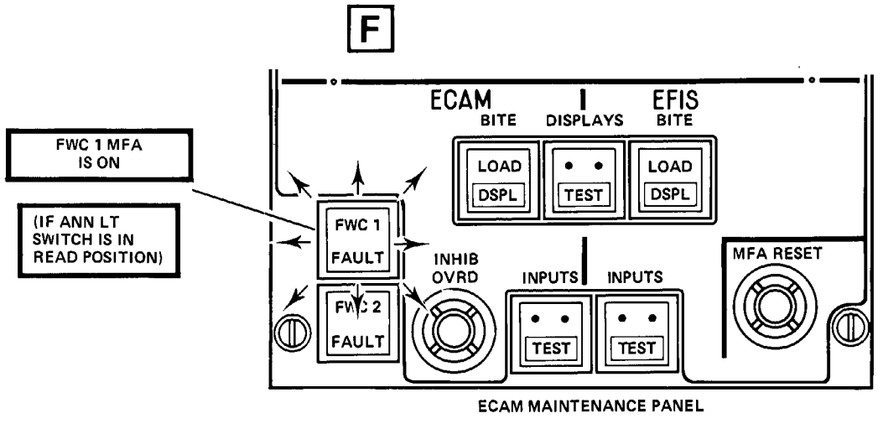












ECAM MAINTENANCE PANEL

BM5 31 51 00 0 SY22-28

Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure - Playback of the Failure Sequence
Figure 075

C. SGU 1 or 2 Failure

**ON A/C 001-004, 006-100,

(Ref. Fig. 076)

**ON A/C 005-005,

(Ref. Fig. 077)

**ON A/C 001-100,

The FAULT legend of the corresponding SGU P/B switch comes on on the ECAM control panel and a diagonal line appears on the concerned side display unit.
When the faulty SGU is switched off, all the functions are available and presented with no change to the crew.

INTENTIONALLY BLANK

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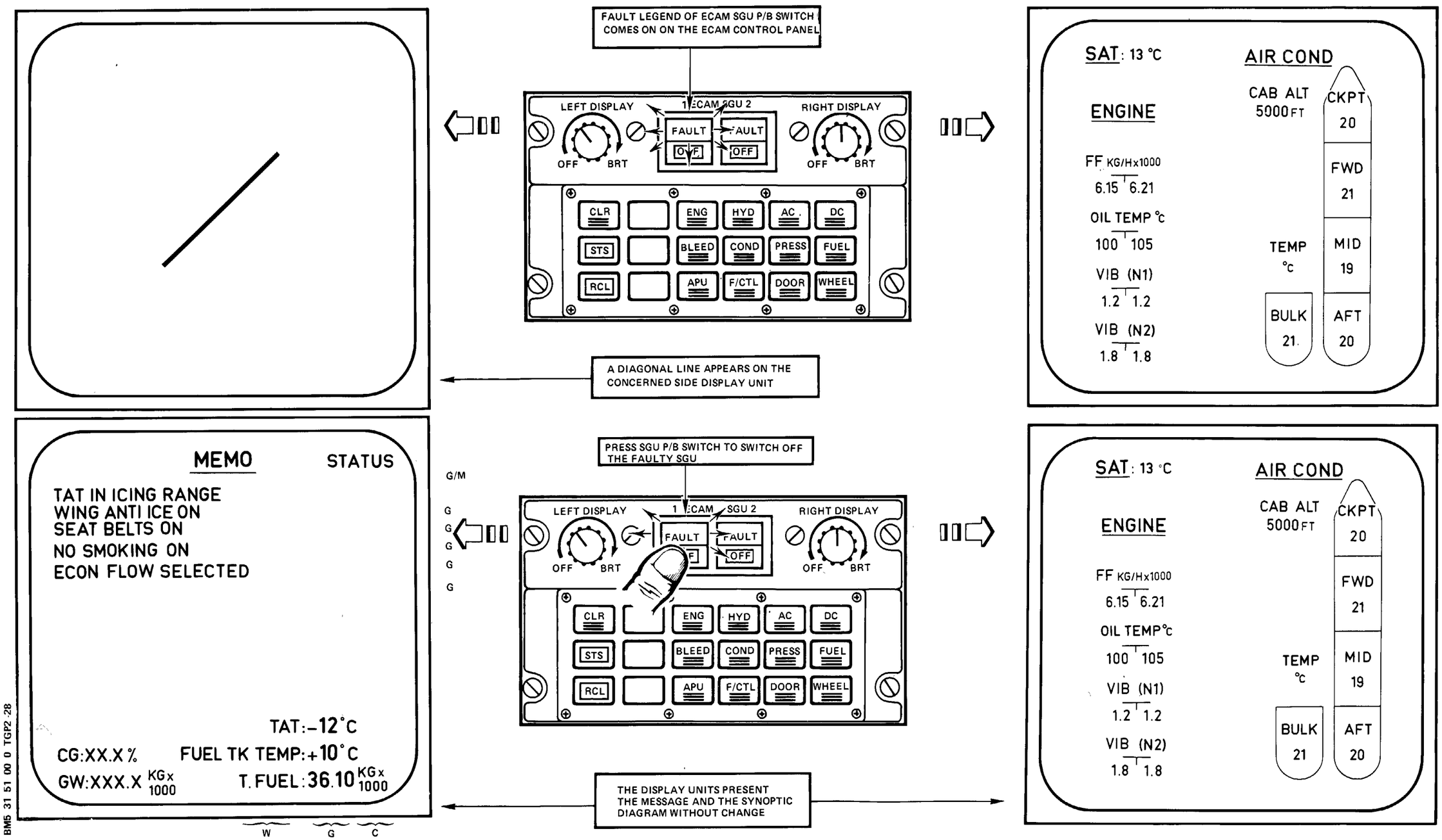
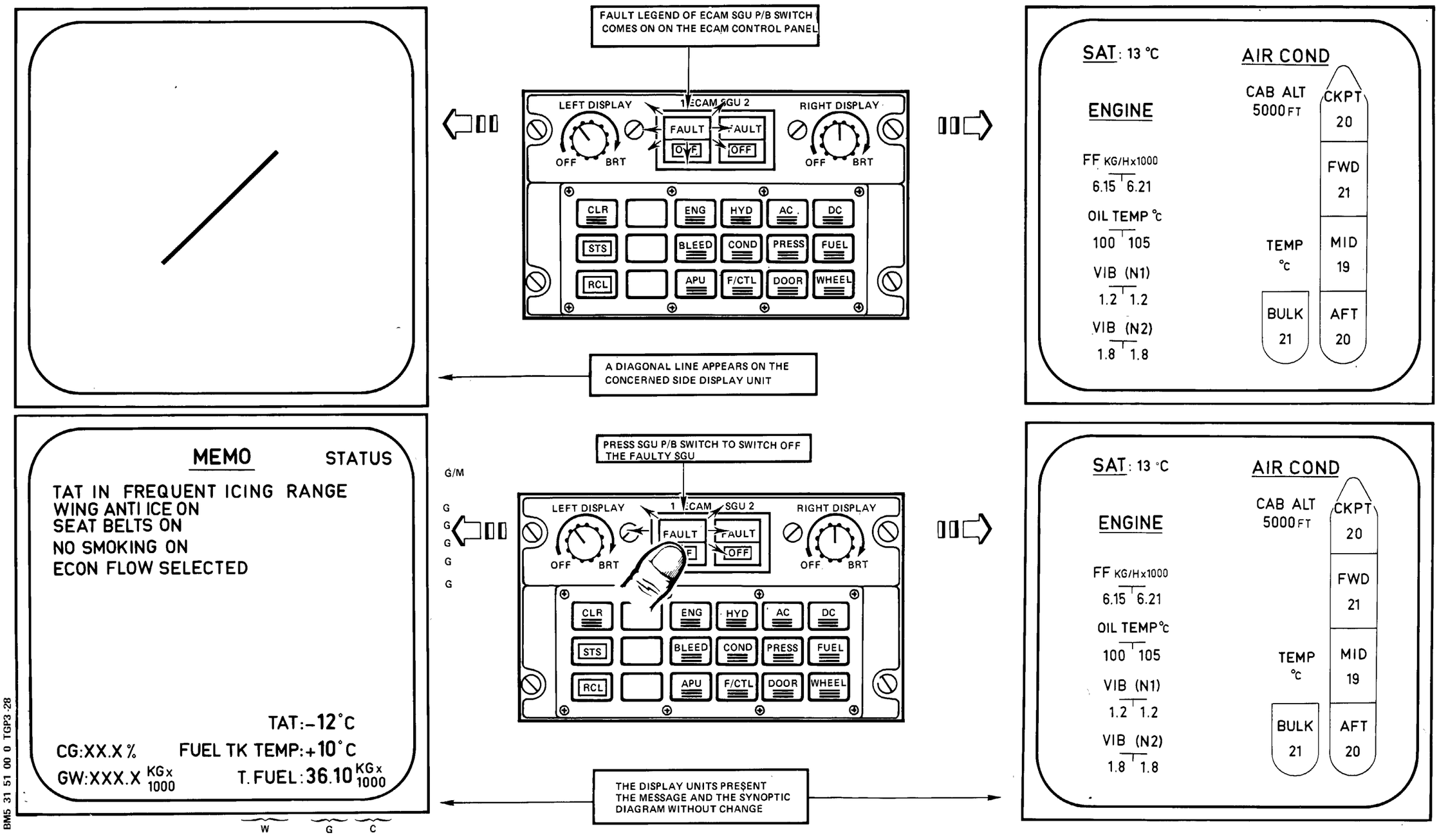


SGU 1 or 2 Failure
Figure 076



SGU 1 or 2 Failure
Figure 077

D. SDAC Failure

The MEMO mode, the system display function and most of the action feedback in the procedure messages are no more available. Some STATUS messages are also lost.

(1)Without aircraft system failure

(Ref. Fig. 078)

SYSTEM DATA NOT AVAILABLE is written in amber in the center of the L and R ECAM display units. Furthermore FUEL QTY AVAIL ... FUEL PAGE is displayed on R ECAM display unit.

(2)With an aircraft system failure

NO ACTION FEED BACK AVAILABLE is written in amber at the top of the L ECAM display unit.

SYSTEM DATA NOT AVAILABLE is written in amber on the R ECAM display unit.

E. Failure of One Display Unit

(Ref. Fig. 079)

When the display unit picture becomes uncomfortable or disappears, the display unit has to be switched off.

The display unit remaining in operation provides the crew with all the functions available to the both display units in a sequential manner.

(1)Without aircraft system failure, the available display unit presents the function normally displayed on the R display unit with the exception of the flight phase related page which is replaced by the MEMO page.

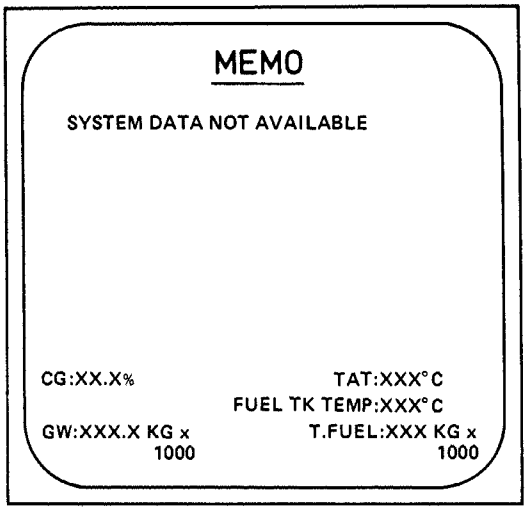
(2)With an aircraft system failure, the available display unit presents the warning and indicating messages.

As for the affected system page, access is then limited to manual selection but only when the warning message is cleared.

F. Failure of Both Display Units

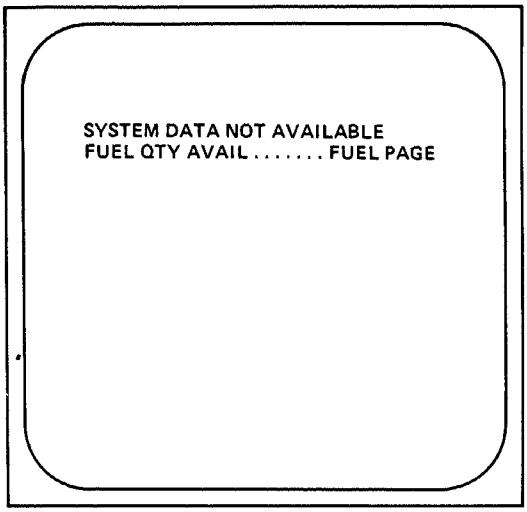
(Ref. Fig. 080)

L ECAM DISPLAY UNIT
PRESENTS THE MESSAGE



G
A

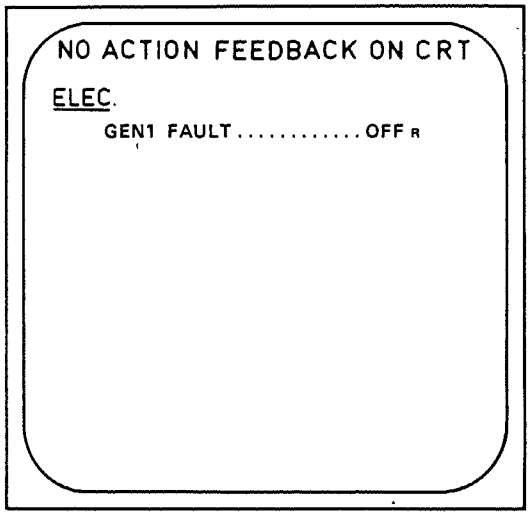
R ECAM DISPLAY UNIT
PRESENTS THE MESSAGE



A
G

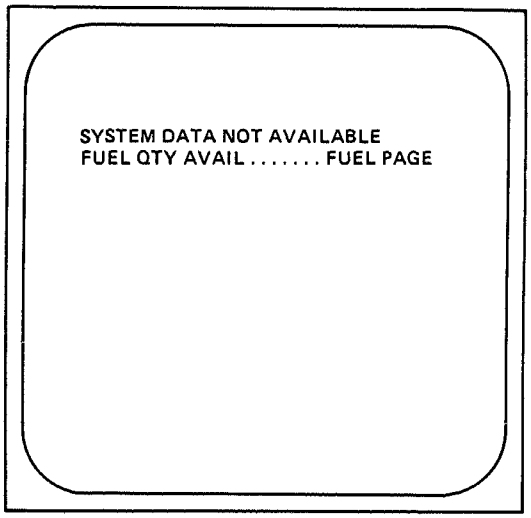
2 - WITH AN AIRCRAFT SYSTEM FAILURE

L ECAM DISPLAY UNIT
PRESENTS THE MESSAGE



A
A
A C

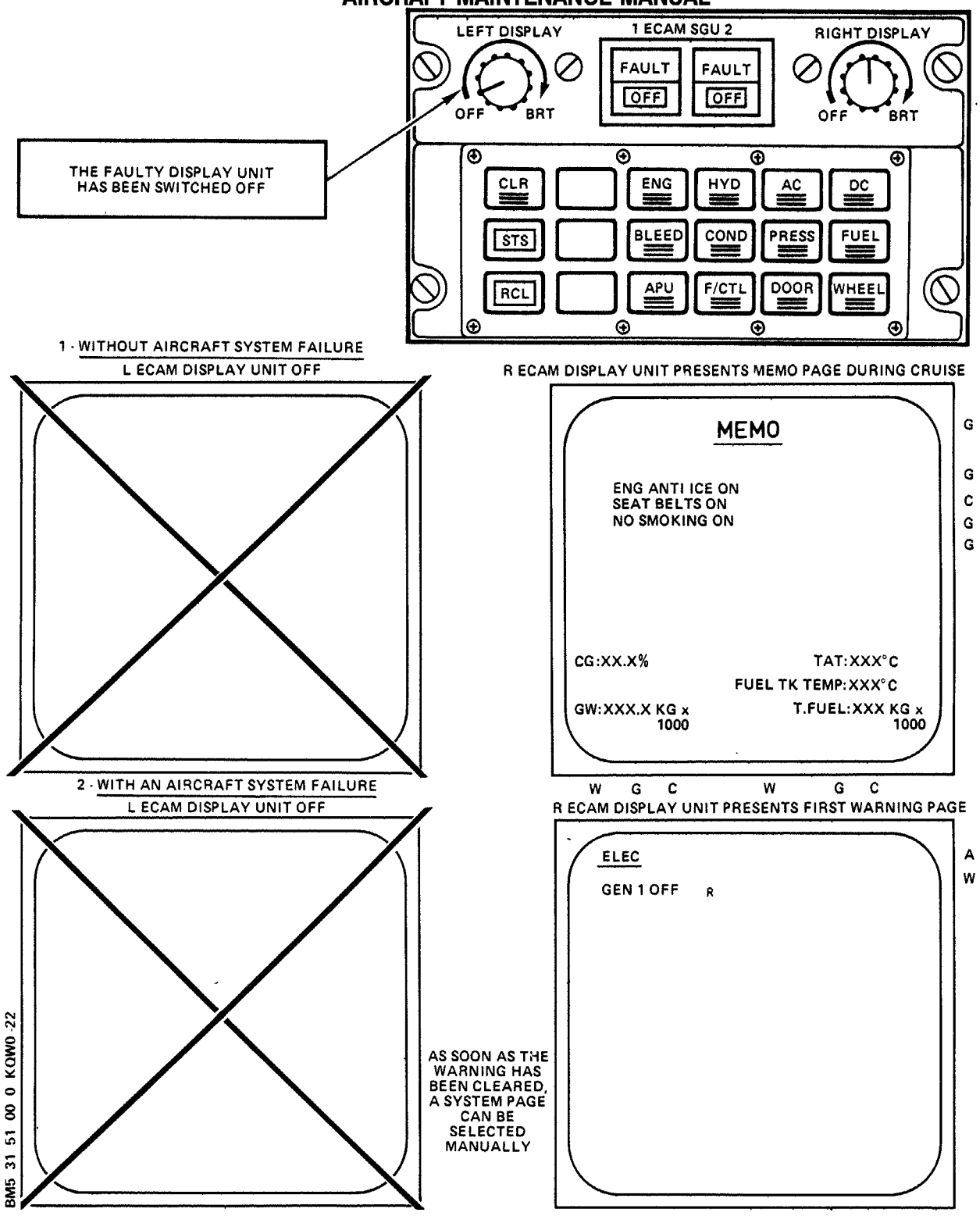
R ECAM DISPLAY UNIT
PRESENTS THE MESSAGE



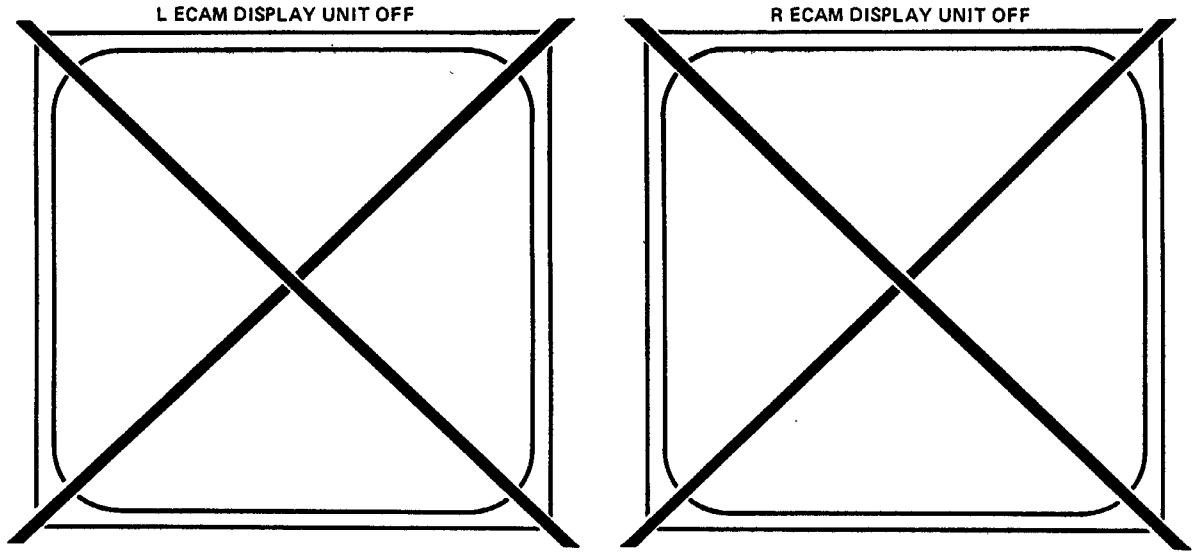
A
G

BM5 31 51 00 0 GEP0 18

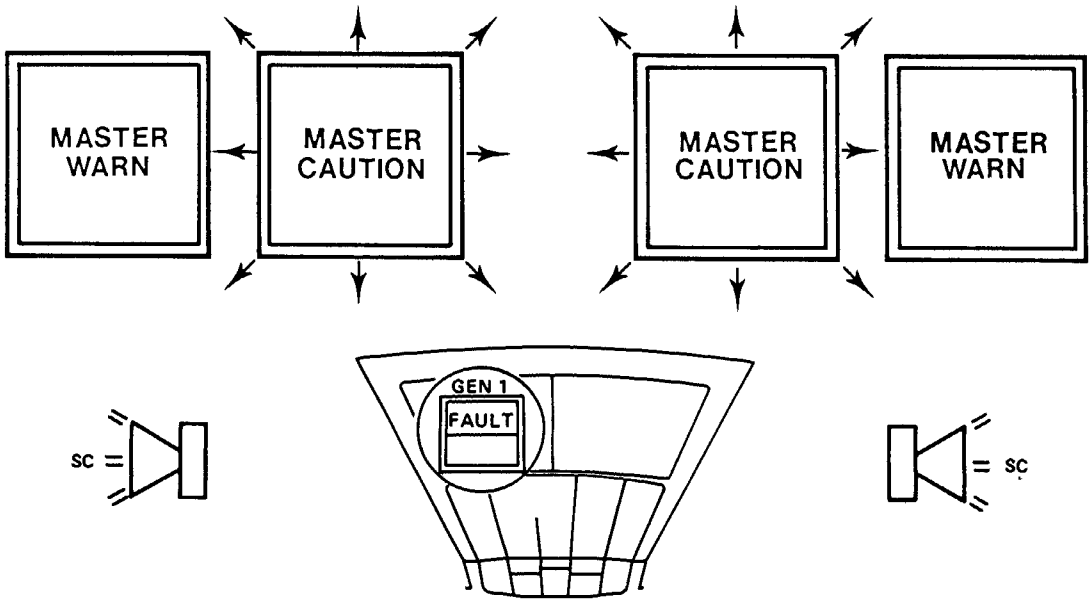
SDAC Failure
Figure 078



Failure of one Display Unit
Figure 079



IN THAT CASE A DETECTION AND A FIRST FAILURE DIAGNOSIS ARE PROVIDED
BY MASTER LIGHTS (LEVEL 3 AND 2 WARNINGS)
AURAL WARNINGS (LEVEL 3 AND 2), AND LIGHTS ON CONTROL PANELS



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Failure of Both Display Units and GEN1 Failure
Figure 080

8. Test Function

Two self tests are provided - Each is associated with a particular program.

A. Automatic Self Test

Each computer is equipped with a monitoring module which automatically checks as soon as the power supply is applied :

- the acquisition module
- the processing module
- the output module
- the memories
- the internal power supply

A power-on routine test checks for correct operation of the symbol generator units.

During this test, no picture is displayed on the ECAM display units.

A FWC failure causes the corresponding FWC FAULT to come on the ECAM maintenance panel, provided that the ANN MFA LT switch on panel (472VU) is placed in READ position (Ref. Fig. 009).

A SGU failure causes the FAULT legend of the corresponding P/B switch to come on on the ECAM control panel (Ref. Fig. 008).

B. Manual Self Test

This test is performed from the ECAM maintenance panel

(1)Inputs test

(Ref. Fig. 081)

(Ref. Fig. 082)

Pressing the INPUTS P/B switch on the ECAM maintenance panel causes TEST legend to come on. Most of the FWCs inputs are checked for continuity and the wrong inputs if any, appear in coded form on the L ECAM display unit. The R ECAM display unit presents the list of SDAC defective parameters (if any).

Both ECAM display units indicate in read out display form the BUS 429 failures.

On the ECAM control panel, press the twelve system P/B switches successively.

Each time a system P/B switch is pressed, the corresponding system synoptic diagram appears on the R ECAM display unit with the mention TEST written beside the title.

The synoptic diagram is shown with calibrated outputs from the SDAC. The defective parameters are presented with flag indication.

(2)Displays test

(Ref. Fig. 083)

Pressing the DISPLAYS P/B switch on the ECAM maintenance panel causes TEST legend to come on. This test checks for correct operation of the SGUs and the optical qualities of the ECAM display units through the display of a test pattern.

(3)BITE test

(Ref. Fig. 084)

The SGUs and FWCs have a non volatile RAM memory in which it is possible to write failure events occurring in the SGUs, FWCs, Display Units or input buses during five flight legs.

SGUs and FWCs internal failures are memorized during all the flight phases. The other failures are only memorized on ground above 70 kts and in flight. The LOAD legend of the ECAM/BITE P/B switch comes on each time one internal failure is written into the BITE memories of one SGU or one FWC during the present flight leg provided that the ANN LT switch is placed in READ position.

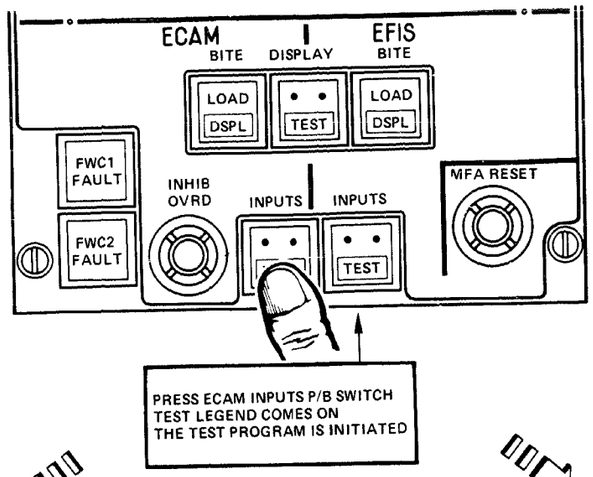
On ground, pressing the P/B switch will initiate the writing of the BITE memory contents on the DUs as follows :

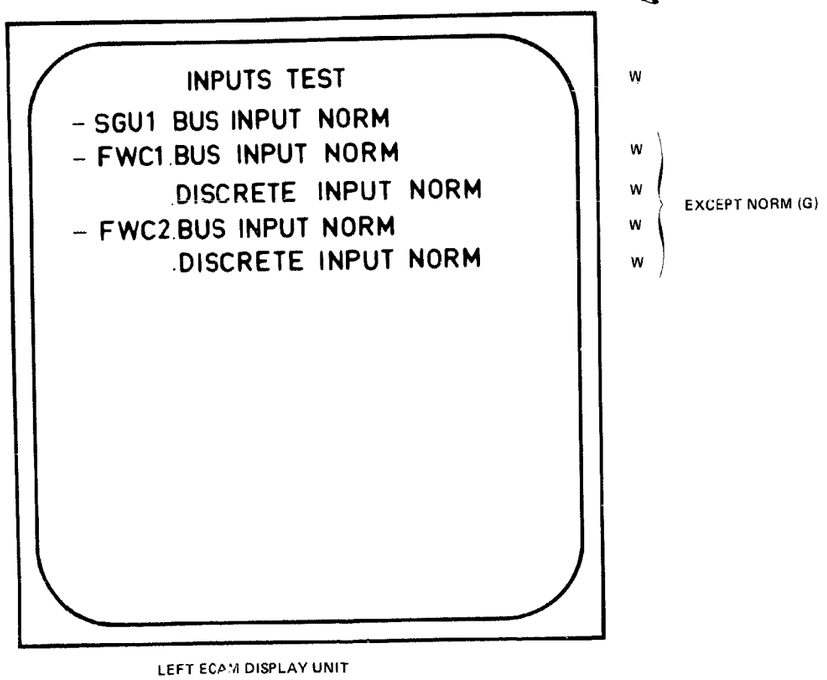
System 1 : left display unit

System 2 : right display unit.

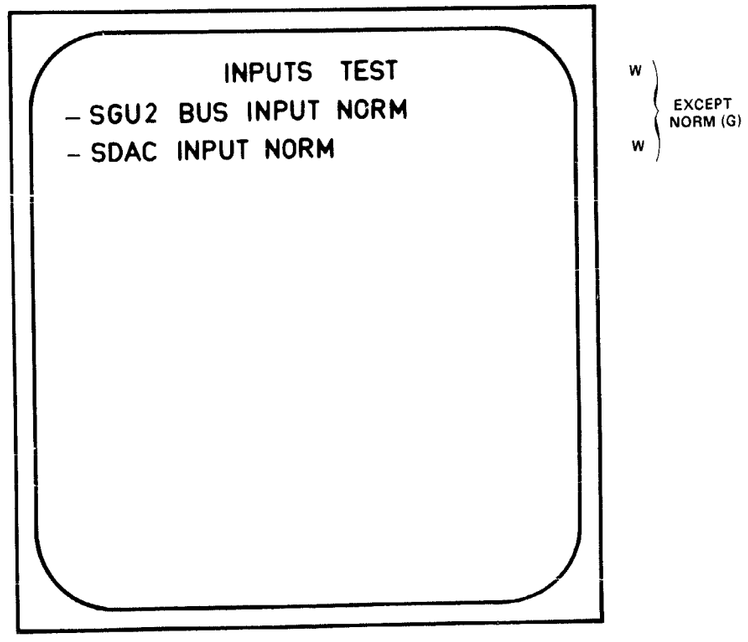
The upper section of the display gives information about the present flight leg in clear language.

The lower section of the display gives information about the present flight leg and the four previous ones in coded form.





LEFT ECAM DISPLAY UNIT



RIGHT ECAM DISPLAY UNIT

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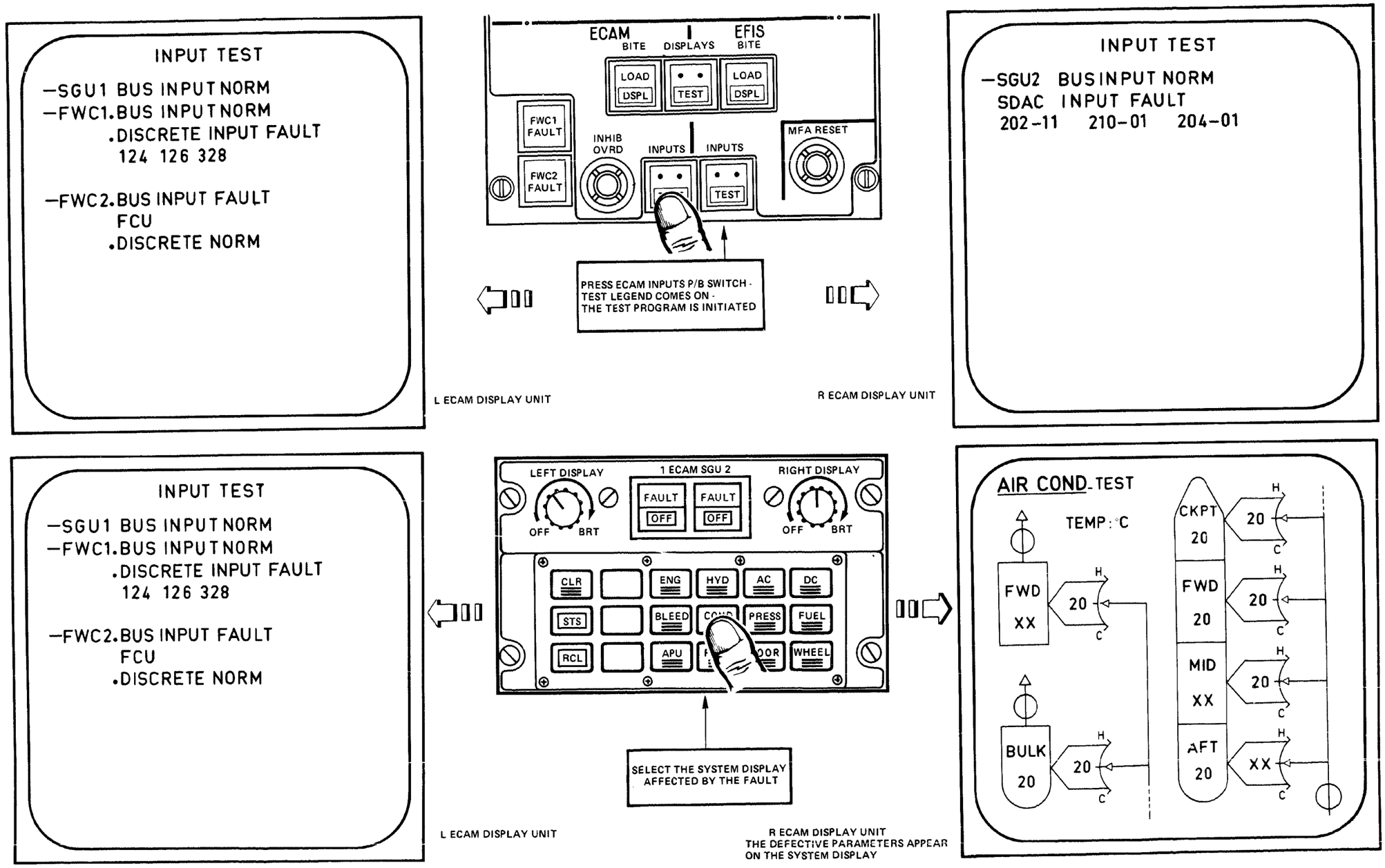
Input Test without Aircraft System Failure
Figure 081



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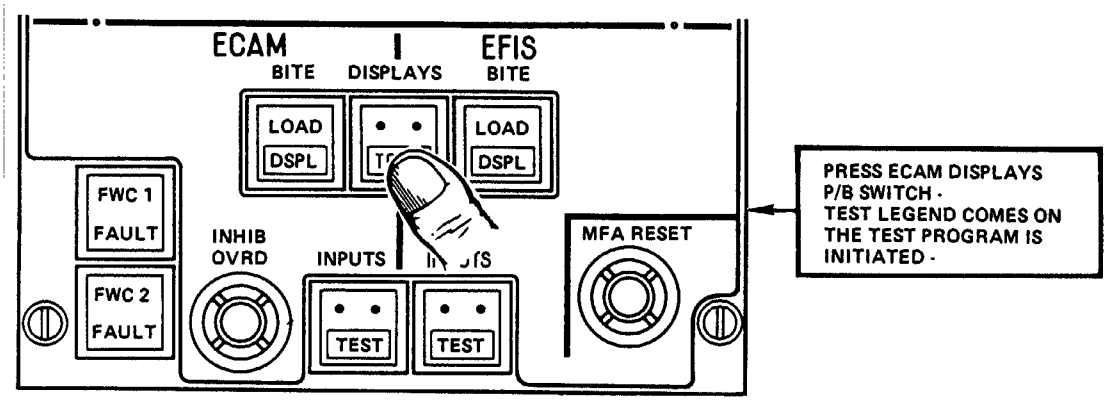
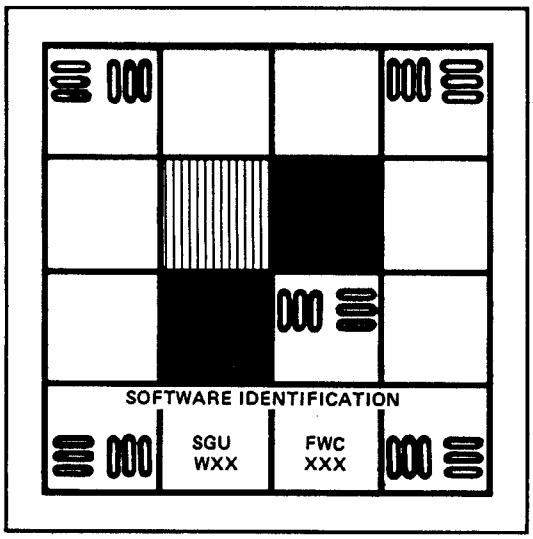
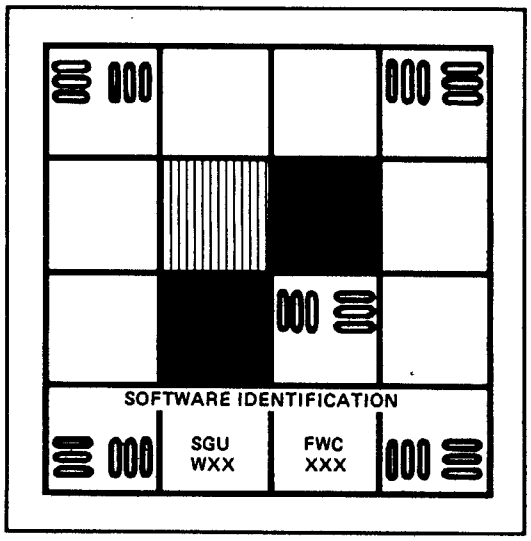
Input Test with Aircraft Failure
Figure 082



L ECAM DISPLAY UNIT



R ECAM DISPLAY UNIT



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Display Test
Figure 083

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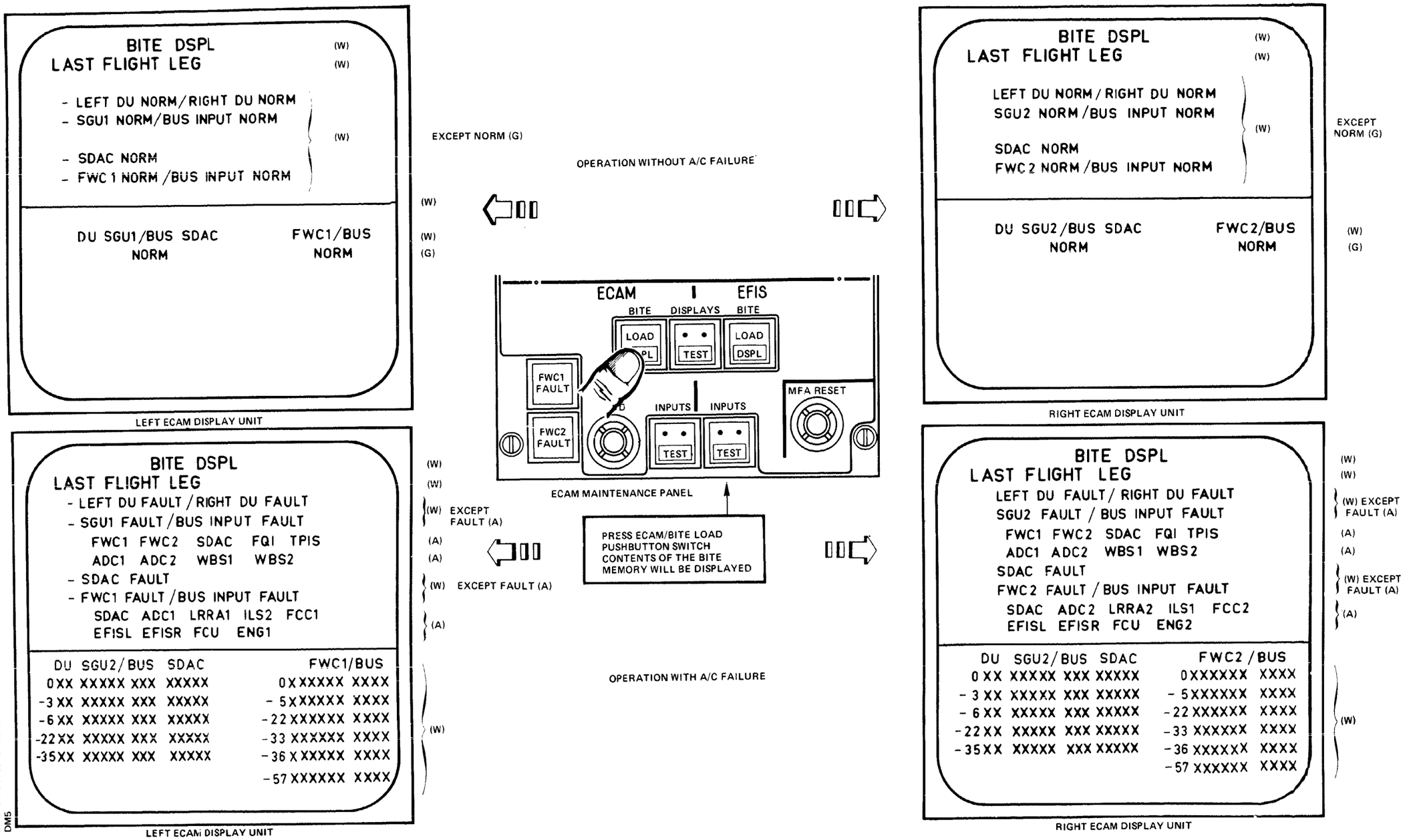
BITE DSPL (W)
LAST FLIGHT LEG (W)
- LEFT DU NORM/RIGHT DU NORM
- SGU1 NORM/BUS INPUT NORM (W)
- SDAC NORM
- FWC 1 NORM /BUS INPUT NORM
DU SGU1/BUS SDAC NORM (W)
FWC1/BUS NORM (G)
LEFT ECAM DISPLAY UNIT
EXCEPT NORM (G)
OPERATION WITHOUT A/C FAILURE
ECAM
EFIS
BITE
DISPLAYS
BITE
LOAD
TEST
LOAD
DSPL
FWC1 FAULT
FWC2 FAULT
INPUTS
INPUTS
TEST
TEST
MFA RESET
ECAM MAINTENANCE PANEL
PRESS ECAM/BITE LOAD PUSHBUTTON SWITCH CONTENTS OF THE BITE MEMORY WILL BE DISPLAYED
BITE DSPL (W)
LAST FLIGHT LEG (W)
LEFT DU NORM / RIGHT DU NORM
SGU2 NORM /BUS INPUT NORM (W)
SDAC NORM
FWC2 NORM /BUS INPUT NORM
DU SGU2/BUS SDAC NORM (W)
FWC2/BUS NORM (G)
EXCEPT NORM (G)
RIGHT ECAM DISPLAY UNIT
BITE DSPL (W)
LAST FLIGHT LEG (W)
- LEFT DU FAULT / RIGHT DU FAULT
- SGU1 FAULT /BUS INPUT FAULT (W) EXCEPT FAULT (A)
FWC1 FWC2 SDAC FQI TPIS
ADC1 ADC2 WBS1 WBS2
- SDAC FAULT (A)
- FWC1 FAULT /BUS INPUT FAULT (A)
SDAC ADC1 LRRA1 ILS2 FCC1
EFISL EFISR FCU ENG1 (W) EXCEPT FAULT (A)
DU SGU2/BUS SDAC FWC1/BUS
0XX XXXXX XXX XXXXX 0XXXXXX XXXX
-3XX XXXXX XXX XXXXX -5XXXXXX XXXX
-6XX XXXXX XXX XXXXX -22XXXXXX XXXX
-22XX XXXXX XXX XXXXX -33XXXXXX XXXX
-35XX XXXXX XXX XXXXX -36XXXXXX XXXX
-57XXXXXX XXXX (W)
LEFT ECAM DISPLAY UNIT
BITE DSPL (W)
LAST FLIGHT LEG (W)
LEFT DU FAULT/ RIGHT DU FAULT
SGU2 FAULT / BUS INPUT FAULT (W) EXCEPT FAULT (A)
FWC1 FWC2 SDAC FQI TPIS
ADC1 ADC2 WBS1 WBS2 (A)
SDAC FAULT (A)
FWC2 FAULT / BUS INPUT FAULT (W) EXCEPT FAULT (A)
SDAC ADC2 LRRA2 ILS1 FCC2
EFISL EFISR FCU ENG2 (A)
DU SGU2/BUS SDAC FWC2 /BUS
0XX XXXXX XXX XXXXX 0XXXXXX XXXX
-3XX XXXXX XXX XXXXX -5XXXXXX XXXX
-6XX XXXXX XXX XXXXX -22XXXXXX XXXX
-22XX XXXXX XXX XXXXX -33XXXXXX XXXX
-35XX XXXXX XXX XXXXX -36XXXXXX XXXX
-57XXXXXX XXXX (W)
RIGHT ECAM DISPLAY UNIT
OPERATION WITH A/C FAILURE

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BITE Test
Figure 084

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R

1. Definition and Objectives

The ECAM (Electronic Centralized Aircraft Monitoring) system provides the crew with operational assistance for both normal and abnormal aircraft system configurations.
This operational assistance is given through two CRT (Cathode Ray Tube) display units by means of messages and system synoptic diagrams.
The data processing is fully automatic and as such does not require any additional crew action or selection.

A. Normal Configuration (Without Aircraft Systems Failure)

The ECAM system improves crew comfort by eliminating the need for frequent scanning of various systems panels for :

- monitoring temporarily used systems or functions
  (MEMO page normally displayed on the L ECAM display unit)
- routine system monitoring
  (System synoptic diagrams adapted to the present flight phase and displayed on the R ECAM display unit)
- systems parameters trending
  (Constant monitoring of some systems parameters which are automatically displayed on the R ECAM display unit when their value drifts out of normal range but well before reaching the warning level).

B. Abnormal or Emergency Configuration

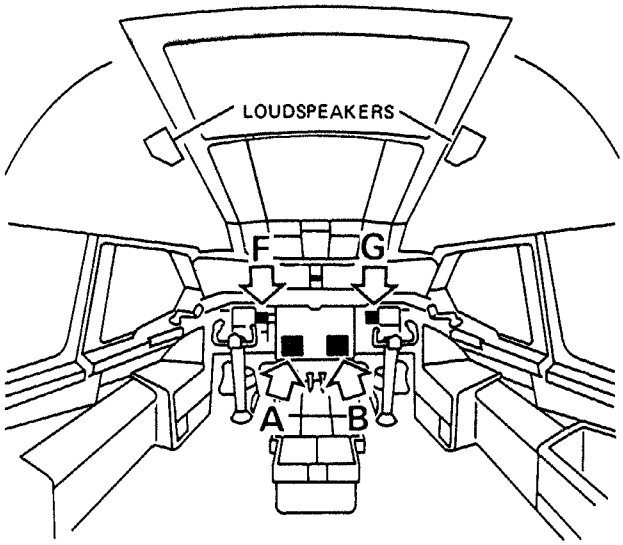
The ECAM system decreases significantly the crew mental workload by providing :

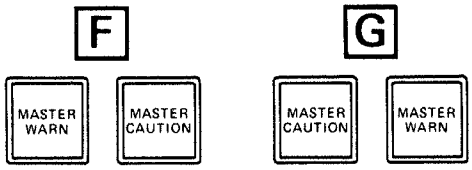
- Improved failure analysis
- Guidance of corrective actions
- Minimization of need to refer to paper check list or normal read out
- Improved understanding of aircraft and system configuration after failure.

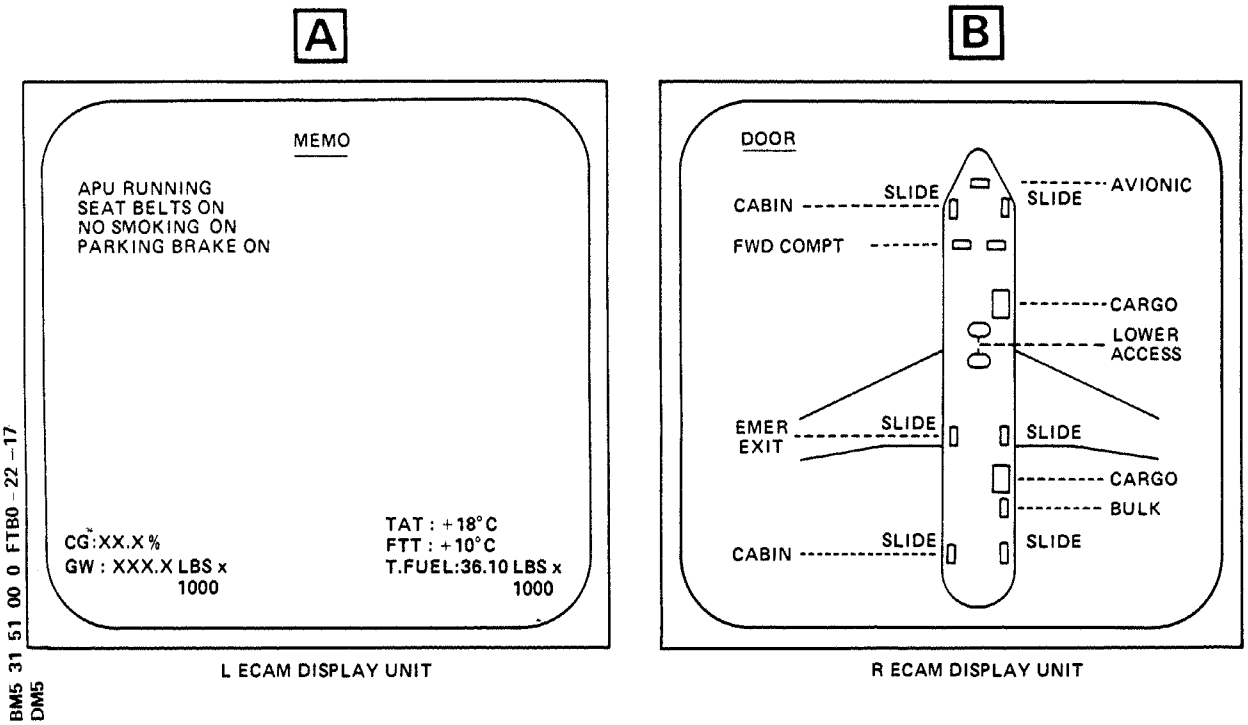
In addition the ECAM system generates aural and visual warnings in compliance with SAE - ARP 450-D and ARINC 726.
The aural warnings are transmitted by the flight compartment loudspeakers and the visual signals supply the ECAM display units and the MASTER lights.
The system does not process warnings with a probability less than 10-9 (extremely remote failure).

2. Component Location
(Ref. Fig. 001)
(Ref. Fig. 002)
(Ref. Fig. 003)
(Ref. Fig. 004)

FIN	FUNCTIONAL DESIGNATION	PANEL	ZONE	ACCESS DOOR	ATA REF.
1WT	DISPLAY UNIT-ECAM, L	4VU	210		31-57-22
1WV	SDAC	94VU	122		31-55-22
1WW1	FWC-1	92VU	122		31-53-34
1WW2	FWC-2	93VU	122		31-53-34
3WT	DISPLAY UNIT-ECAM, R	4VU	210		31-57-23
5WT	CTL PNL-ECAM	11VU	210		31-57-11
9WT1	SGU-ECAM, 1	92VU	122		31-57-34
9WT2	SGU-ECAM, 2	93VU	122		31-57-34
10WW	ANNUNCIATOR-ECAM/FWC2 FAULT	470VU	212		
11WW	ANNUNCIATOR-ECAM/FWC1 FAULT	470VU	212		
13WT	P/BSW-ECAM/DISPLAYS	470VU	212		
16WT	P/BSW-ECAM/BITE	470VU	212		
13WW	P/BSW-ECAM/INPUTS	470VU	212		
15WW	P/BSW-NORM CANCEL	417VU	210		
16WW	SWITCH-EMER CANCEL	417VU	210		
17WW	LOUDSPEAKER-CAPT		211		31-53-25
18WW	LOUDSPEAKER-F/O		212		31-53-25
36WW	LIGHT-MASTER WARN, CAPT	3VU	210		
37WW	LIGHT-MASTER CAUTION, CAPT	3VU	210		
38WW	LIGHT-MASTER WARN, F/O	5VU	210		
39WW	LIGHT-MASTER CAUTION, F/O	5VU	210		
41WW	TRANSMITTER - THS POSITION	9VU	120		31-53-15







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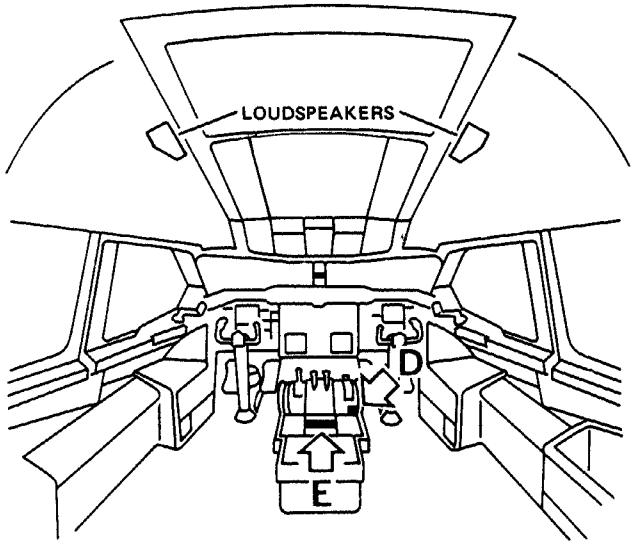
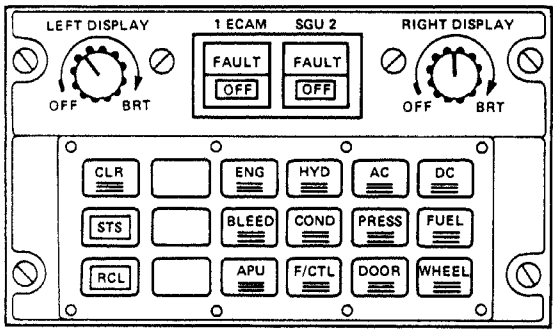
ECAM System - Component Location in the Flight Compartment Sheet 1/3
Figure 001

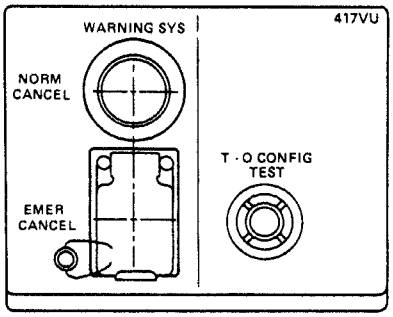


E

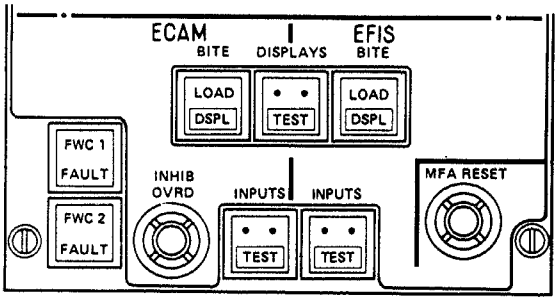


ECAM CONTROL PANEL

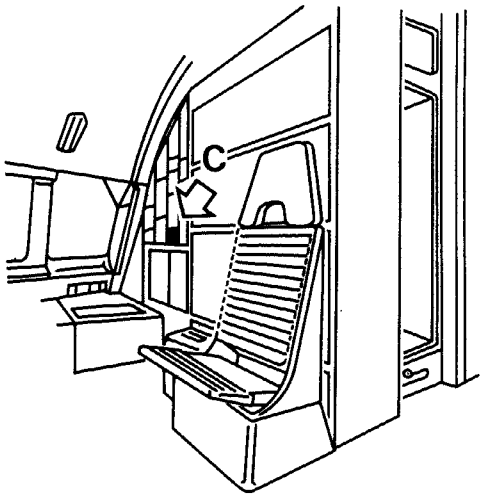
D



C



ECAM MAINTENANCE PANEL



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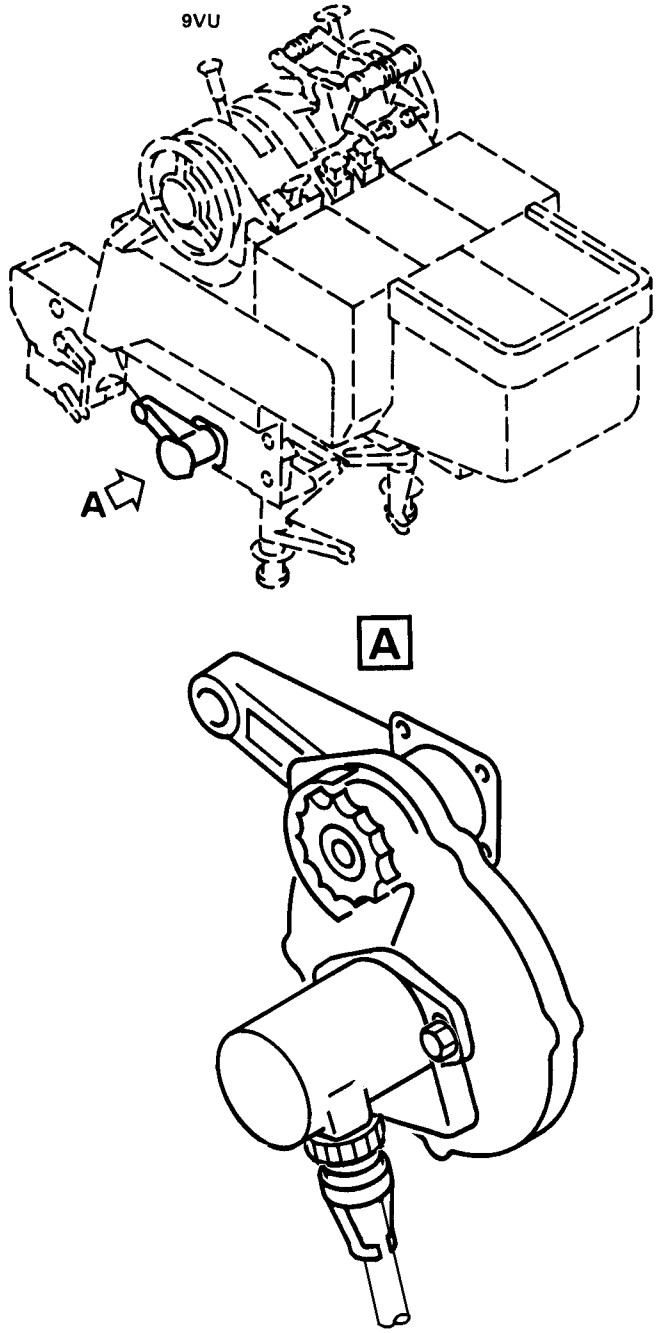
ECAM System - Component Location in the
Flight Compartment Sheet 2/3
Figure 002



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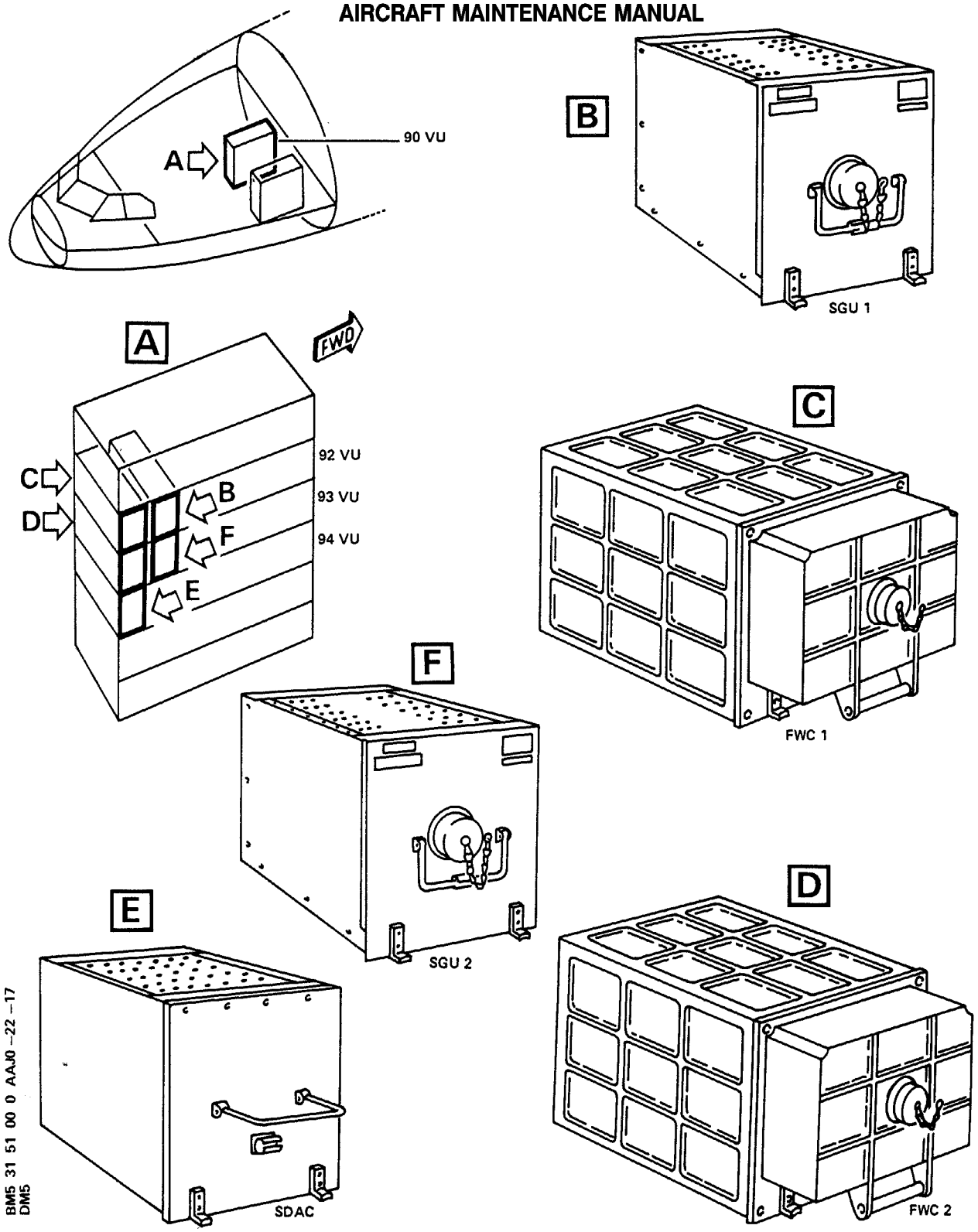
ECAM System - Component Location in the
Flight Compartment Sheet 3/3
Figure 003



ECAM System - Component Location in the Avionics Compartment
Figure 004

3. ECAM System Architecture

(Ref. Fig. 005)

The ECAM system consists of :

- Two FWCs (Flight Warning Computer) which acquire the aircraft systems data to process warning indications and the status functions. The critical failure warning signals (mainly identified by red lights) supply each FWC. The other signals (mainly identified by amber lights) are split between the two FWCs with an exchange of data through a cross-talk bus.
  The FWCs generate also the aural warning signals, the vocal information (Automatic Callout Function), the MASTER lights control signals, the stick shaker control signals, the AFS warning signals and the data for the AIDS system.
- A SDAC (System Data Analog Converter) which acquires various analog and discrete data and converts them into digital form necessary for further processing.
  The SDAC has a complete capacity of :
  200 discrete inputs
  150 analog inputs
- Two SGUs (Symbol Generator Unit) which process outputs from both FWCs, CGCC, SDAC, TPIS, ADC and FQI systems in order to present either system displays or various messages.
- Two full-color shadow-mask high-resolution CRT display units which present system displays and messages.
  The ECAM display units are interchangeable with the EFIS display units. (Ref. 34-70-00, P. Block 001).
- 2 MASTER WARN and MASTER CAUTION lights (P/B switches) which provide visual warning signals.

(Ref. Fig. 006)

- An ECAM control panel which allows the crew to :
  - clear warning presentation by pressing the CLR pushbutton switch
  - call manually the STATUS function by pressing the STS pushbutton switch
  - play back the failure sequence by pressing the RCL pushbutton switch
  - select manually a system display.

(Ref. Fig. 007)

(Ref. Fig. 008)

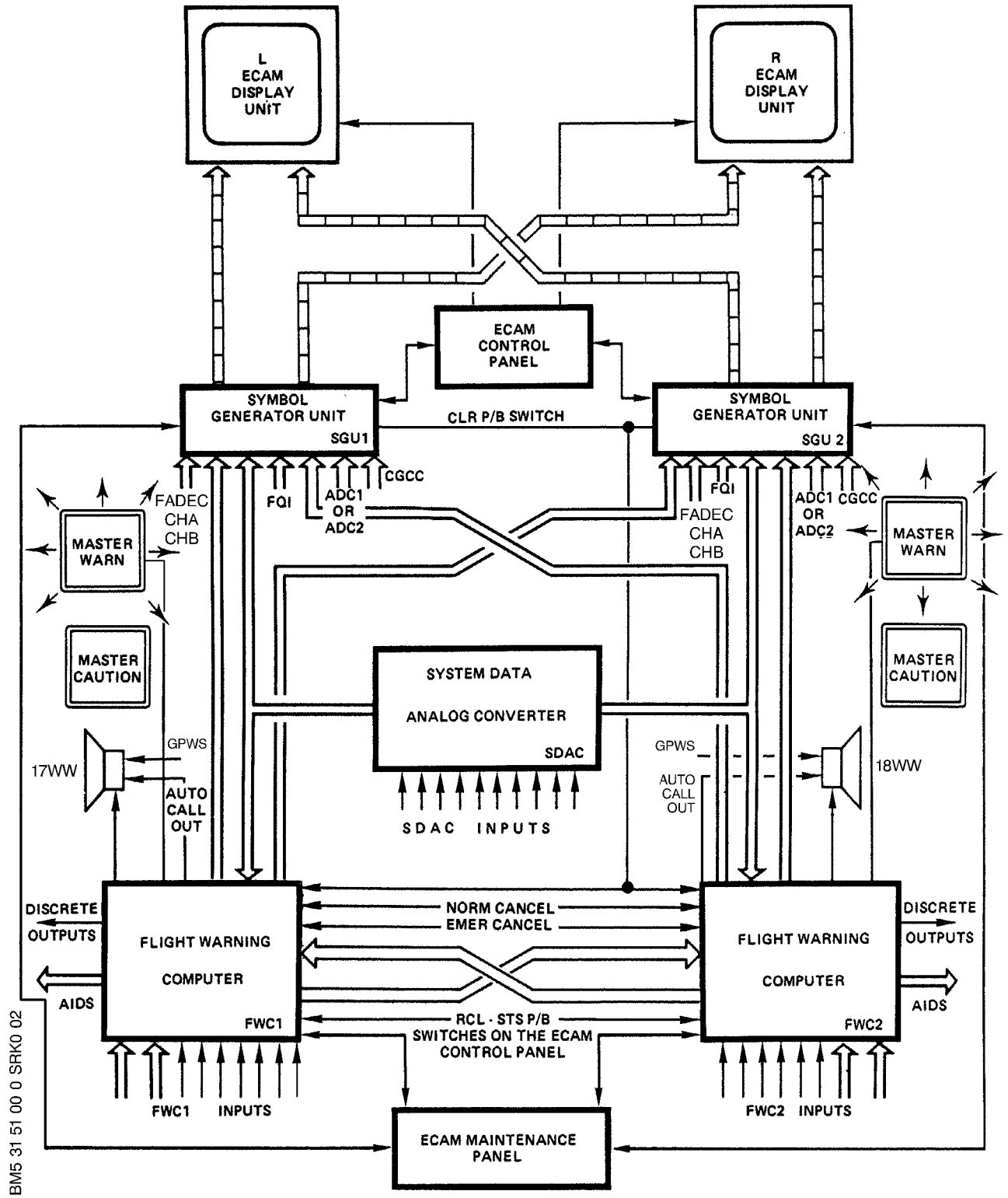
- An audio interface with :
  - 2 loudspeakers
  - 1 NORM CANCEL pushbutton switch
  - 1 EMER CANCEL switch

(Ref. Fig. 009)

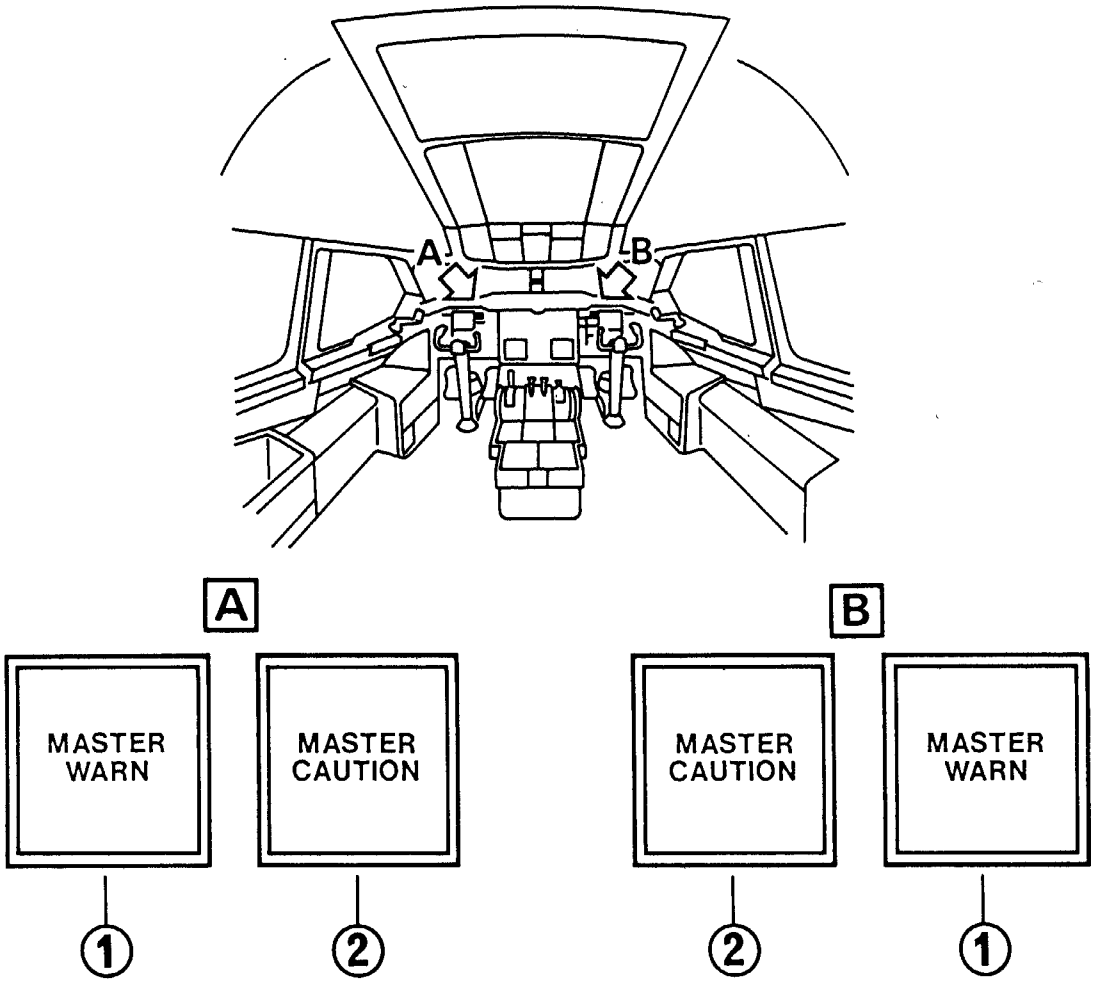
- An ECAM maintenance panel which is used for all maintenance operations and trouble-shooting on ground.

(Ref. Fig. 010)

NOTE : - each FWC has the complete capacity to acquire and process all the critical failure warning signals.
- each FWC has the complete capacity to process all the non critical failure warning signals.
- each FWC has only the half capacity to acquire the non critical failure warning signals.
- each SGU has the capacity to drive both ECAM display units.



ECAM System - Block Diagram
Figure 005



1 - RED MASTER WARN LIGHTS - FLASHING - REQUIRE IMMEDIATE CREW ACTION.

IN THE EVENT OF RED WARNING, PRESSING ONE MASTER WARN LIGHT CAUSES BOTH MASTER WARN LIGHTS TO GO OFF AND AURAL WARNING FOR WHICH THE INHIBITION IS AUTHORIZED BY THE OFFICIAL RULES TO BE STOPPED.

2 - AMBER MASTER CAUTION LIGHTS - STEADY - ACTION TO BE PERFORMED DEPENDS ON CREW DECISION.
IN THE EVENT OF AMBER WARNING PRESSING ONE MASTER CAUTION LIGHT CAUSES BOTH MASTER CAUTION LIGHTS TO GO OFF.

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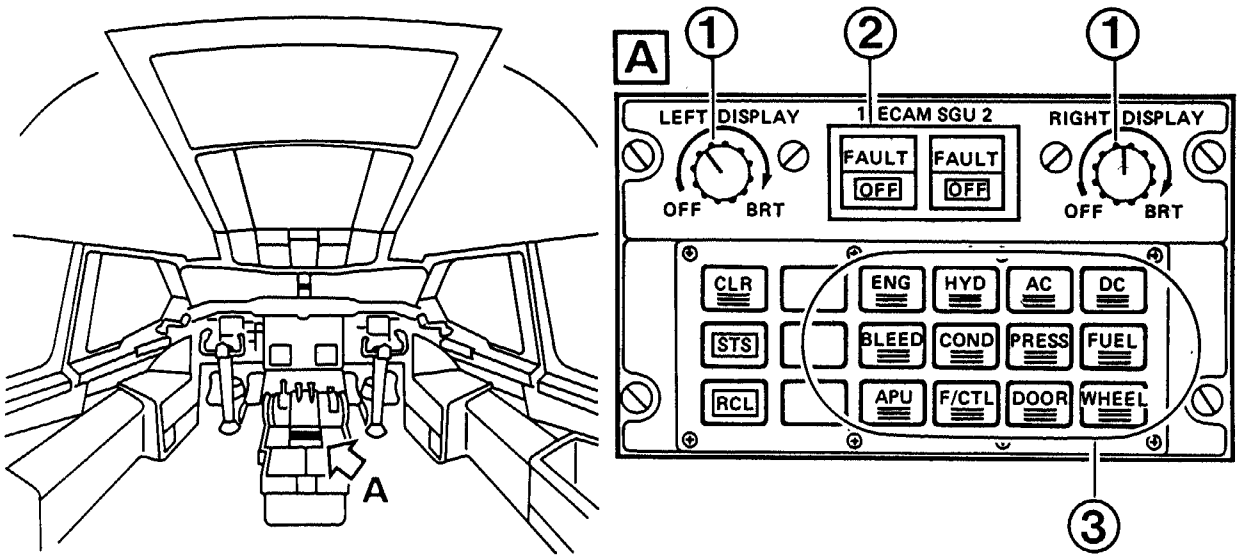
MASTER WARN and MASTER CAUTION Lights
Figure 006



1 - TWO CONTROL SWITCHES ENABLE EACH ECAM DISPLAY UNIT TO BE SWITCHED ON AND THE BRIGHTNESS OF THE IMAGES TO BE ADJUSTED.

2 - ECAM SGU1 AND SGU2 P/B SWITCH LEGENDS ARE OFF IN NORMAL OPERATION.
THE FAULT LEGEND COMES ON AMBER IF A FAILURE IS DETECTED BY THE SGU INTERNAL SELF TEST.
RELEASING THE SGU1 OR 2 P/B SWITCH SWITCHES OFF THE CORRESPONDING SGU. CAUSES THE FAULT LEGEND TO GO OFF AND THE OFF LEGEND TO COME ON WHITE.
BOTH ECAM DISPLAY UNITS ARE DRIVEN BY THE AVAILABLE SGU.

3 - SYSTEM P/B SWITCHES ALLOW THE MANUAL SELECTION OF SYSTEM SYNOPTIC DIAGRAM DISPLAY ON THE R DISPLAY UNIT.
DISENGAGEMENT IS OBTAINED MANUALLY WHEN THE SYSTEM P/B SWITCH WITH LT ON OR ANOTHER ONE IS PRESSED OR AUTOMATICALLY WHEN A WARNING OR AN ADVISORY OCCURS.
IN SINGLE DISPLAY CONFIGURATION, MANUAL SELECTION IS NOT POSSIBLE IF A WARNING OR A STATUS MESSAGE IS DISPLAYED.

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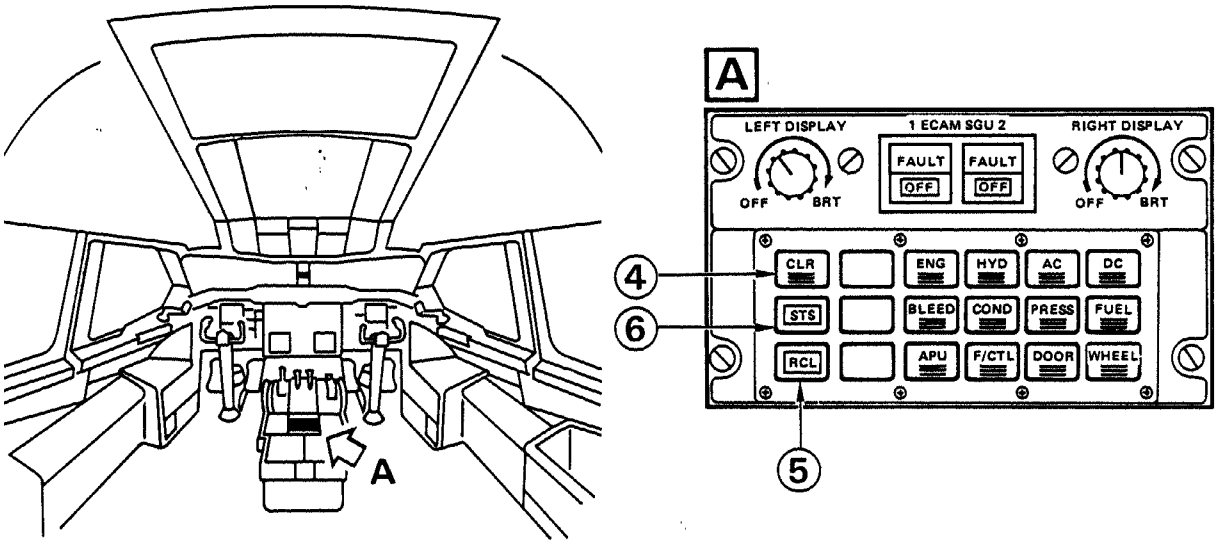
ECAM Control Panel (1/2)
Figure 007



4 - CLR P/B SWITCH LT COMES ON WHITE AS LONG AS A WARNING OR STATUS MESSAGE IS PRESENT ON THE L ECAM DISPLAY UNIT.
PRESS AS MANY TIMES AS NECESSARY THE CLR P/B SWITCH UNTIL CLR LT GOES OFF TO CHANGE THE MESSAGES DISPLAYED AND EXTINGUISH THE MASTER WARN AND MASTER CAUTION LIGHTS.

5 - RCL P/B SWITCH ENABLES THE WARNING MESSAGES PREVIOUSLY CLEARED TO BE DISPLAYED AGAIN PROVIDED THE CONDITIONS WHICH GAVE RISE TO THEM ARE STILL PRESENT. RECALL IS POSSIBLE EVEN IF THE WARNINGS ARE FLIGHT PHASE INHIBITED PRESSING THE RCL P/B SWITCH CAUSES THE CLR P/B SW LT COME ON.
IF THE FAILURE HAS DISAPPEARED THE MENTION NORMAL IS DISPLAYED ON THE L ECAM DISPLAY UNIT.

6 - STS P/B SWITCH ENABLES A STATUS MESSAGE (AIRCRAFT STATUS) TO BE CALLED MANUALLY IF NO WARNING IS DISPLAYED. PRESSING THE STS P/B SWITCH CAUSES THE CLR P/B SW LT TO COME ON. THE STATUS MESSAGE IS SUPPRESSED AUTOMATICALLY IF A WARNING OCCURS OR MANUALLY IF THE CLR P/B SWITCH IS PRESSED. THE STS P/B SWITCH LEGEND DOES NOT COMES ON. STATUS MESSAGES ARE NOT DISPLAYED DURING FLIGHT PHASES 1 AND 12. (REF. FIG. 016).

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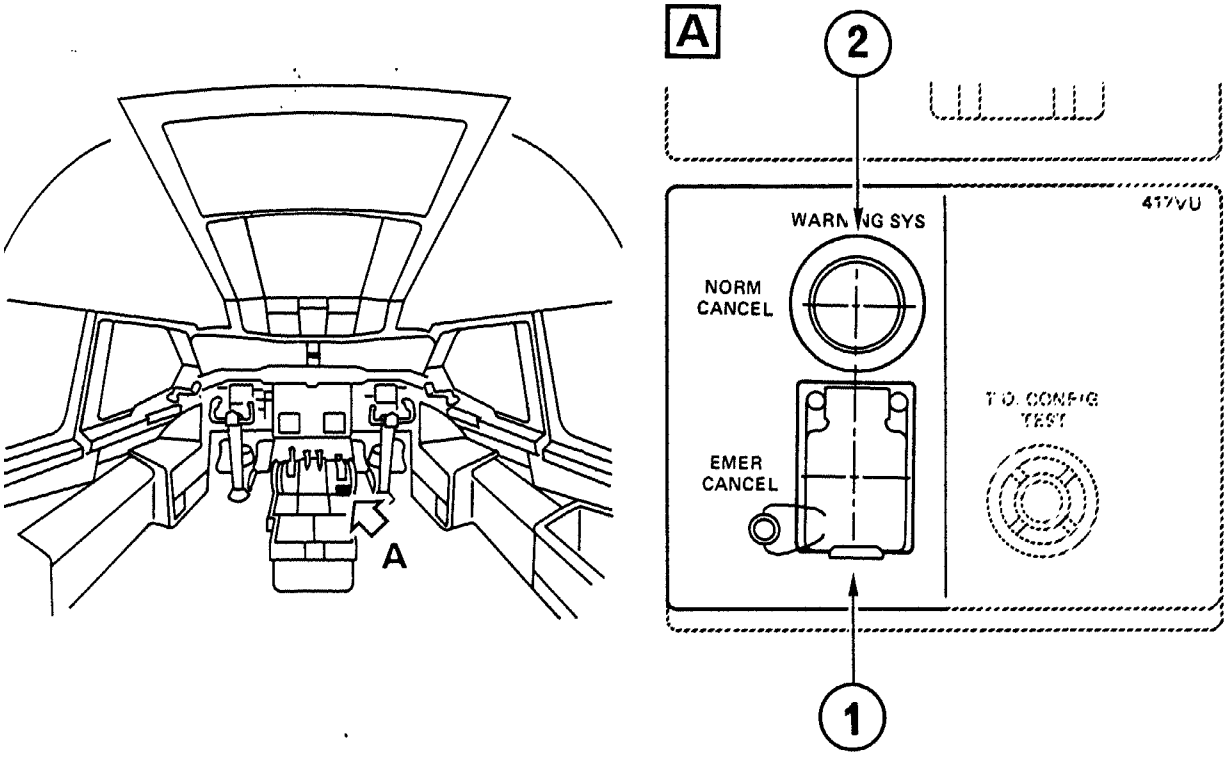
ECAM Control Panel (2/2)
Figure 008



1 - EMER CANCEL GUARDED SWITCH ENABLES CANCELLATION OF ANY AMBER WARNING AND CONTINUOUS AURAL WARNINGS IT HAS TO BE USED IN CASE OF RANDOM AND REPETITIVE WARNINGS WHICH WILL PRODUCE AN OPERATIONAL NUISANCE.

2 - NORM CANCEL P/B SWITCH ENABLES CANCELLATION OF AURAL WARNINGS FOR WHICH THE INHIBITION IS AUTHORIZED BY THE OFFICIAL RULES.

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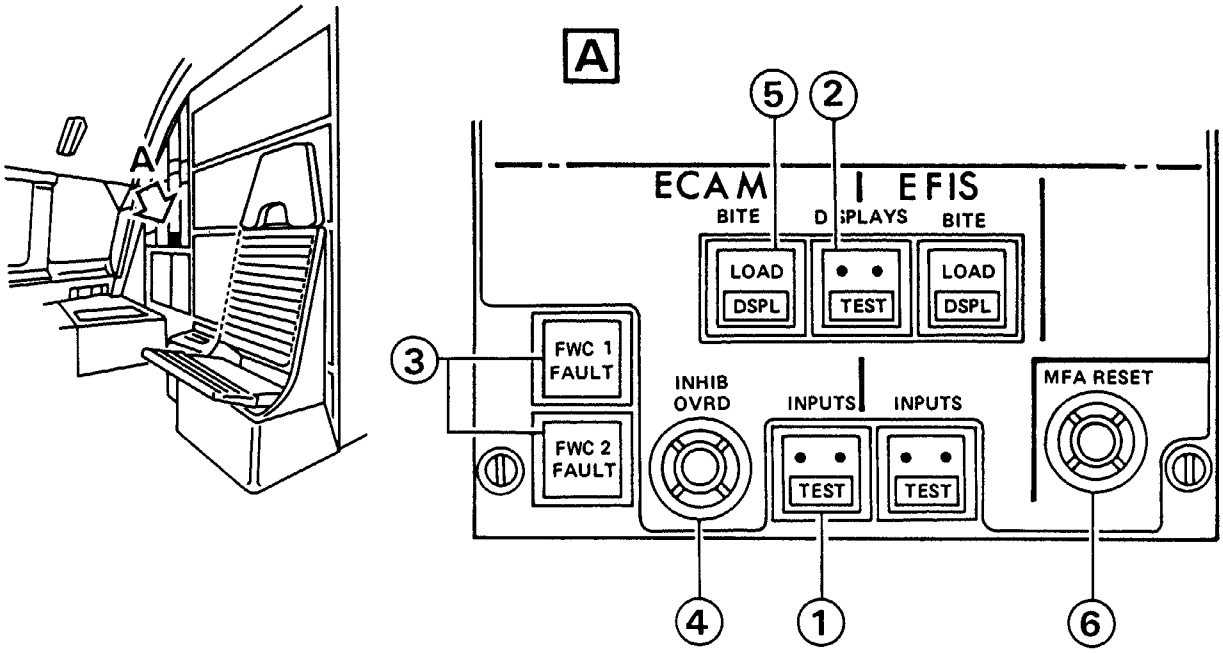
WARNING SYS Panel
Figure 009



1 - INPUTS P/B SWITCH
PRESSING IT CAUSES THE TEST LEGEND TO COME ON WHITE AND INITIATES THE INPUTS BITE TEST. THE WRONG INPUTS OF THE ECAM SYSTEM APPEAR IN CODED FORM ON THE ECAM DISPLAY UNITS. (ONLY DURING FLIGHT PHASES 1 AND 12).

2 - DISPLAYS P/B SWITCH.
PRESSING IT CAUSES THE TEST LEGEND TO COME ON WHITE AND INITIATES THE SGUs INTERNAL SELF TEST. THIS TEST ENABLES THE DISPLAY QUALITY TO BE CHECKED. A TYPICAL TEST PATTERN APPEARS ON EACH, ECAM DISPLAY UNIT. INHIBITED FROM FLIGHT PHASES 4 TO 10).

3 - FWC1/FWC2 FAULT MFA'S COME ON WHITE WHEN THE CORRESPONDING LRU FAILS, PROVIDED THAT ANN LT SWITCH IS PLACED IN READ POSITION (472VU).

4 - INHIB OVRD P/B SWITCH ALLOWS THE PRESENTATION OF WARNINGS INHIBITED ON GROUND, WHEN BOTH ENGINES ARE SHUT DOWN (FLIGHT PHASE 1).

5 - BITE P/B SWITCH
LOAD LEGEND OF BITE P/B SWITCH COMES ON EACH TIME AN INTERNAL FAILURE EVENT IS MEMORIZED IN THE BITE MEMORIES OF SGU1 (AND 2) AND FWC1 (AND 2) PROVIDED THAT ANN LT SWITCH IS PLACED IN READ POSITION.
ENGAGEMENT OF THE BITE DISPLAY FUNCTION WILL CALL SGU1(2) AND FWC1(2) BITE MEMORY CONTENTS ON LEFT AND RIGHT DISPLAY UNITS (ONLY DURING FLIGHT PHASES 1 AND 12)

6 - MFA RESET P/B SWITCH ALLOWS TO EXTINGUISH ALL THE MEMORIZED FAULT ANNUNCIATORS (MFA) LOCATED ON PANEL 470VU. ON THIS FIGURE, ONLY FWC1 AND FWC2 FAULT MFA'S ARE CONCERNED.

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ECAM Maintenance Panel
Figure 010

4. Power Supply

(Ref. Fig. 011)

The L ECAM display unit and the SGU1 are both supplied with 115VAC 400 Hz ; they are fed by the AC NORM busbar 105 XP-B respectively through the circuit breakers 7WT and 11WT1.

The R ECAM display unit and the SGU2 are both supplied with 115VAC 400 Hz ; they are fed by the AC NORM busbar 205 XP-B respectively through the circuit breakers 8WT and 11WT2.

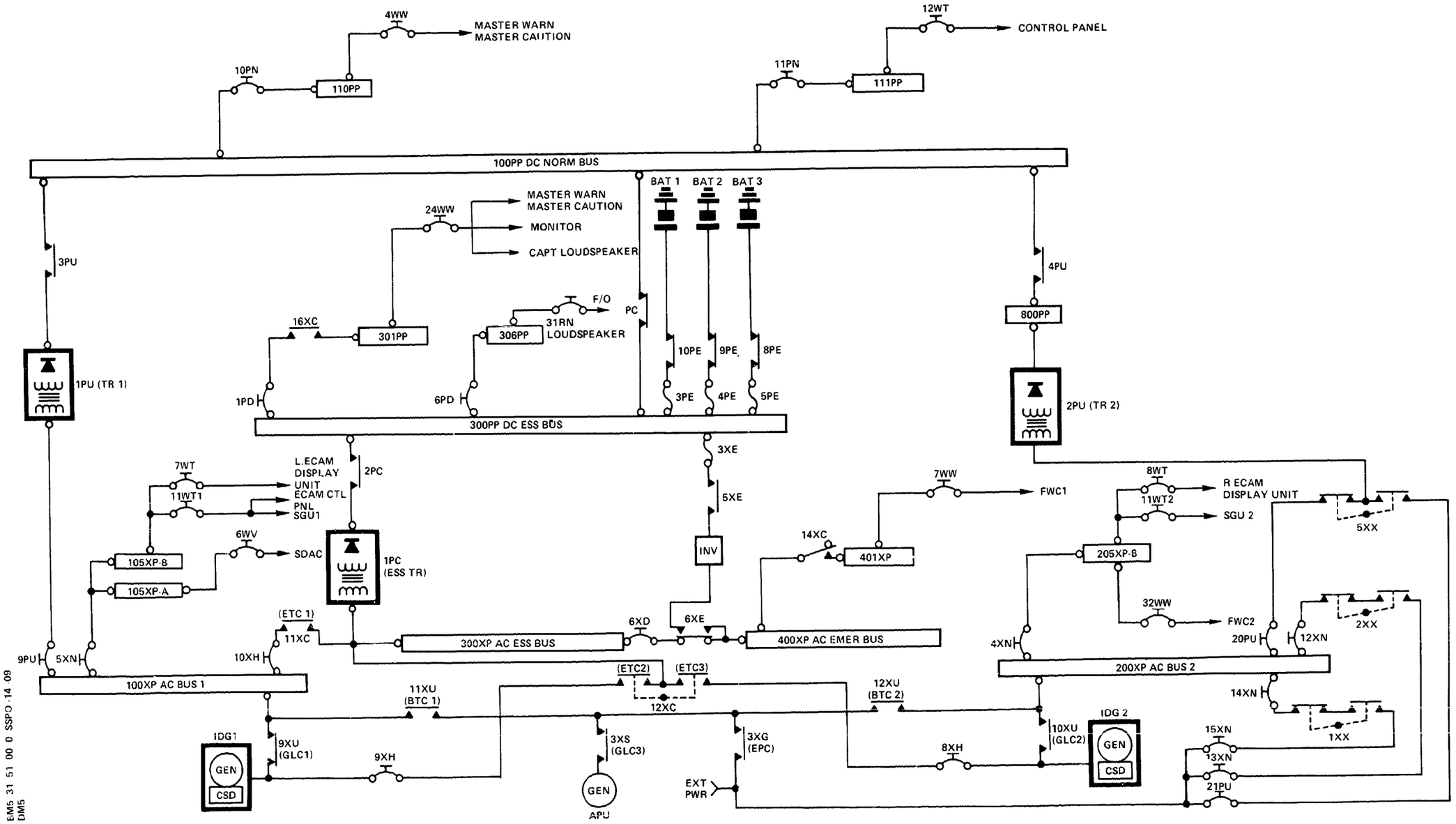
The SDAC is fed by the AC NORM busbar 105 XP-A (115VAC 400 Hz) through the circuit breaker 6WV.

The ECAM control panel is supplied with 28VDC by the DC NORM busbar 111PP through the circuit breaker 12WT and also with 115VAC by the AC NORM busbar 105 XP-B through the circuit breaker 11WT1 for the supply of the lamps illumination logic circuit.

The FWC1 is supplied with 115VAC 400Hz, from the AC EMER busbar 401 XP through the circuit breaker 7WW. The FWC2 is supplied with 115VAC 400Hz, from the AC NORM busbar 205 XP-B through the circuit breaker 32WW.

The MASTER WARN and MASTER CAUTION lights are supplied with 28VDC by DC NORM busbar 110PP and DC ESS busbar 301 PP, through circuit breakers 4WW and 24WW.

The DC power supply is only used for control panel light illumination, MASTER WARN and MASTER CAUTION lights and loudspeakers.



ECAM System Power Supply
Figure 011

5. ECAM Functions

A. Basic Principles

The two following principles have been adopted

(1)Flight compartment "lights out" philosophy

In normal operation all the lights are off. The use of lights to indicate correct operation is limited to a minimum (green illumination for normal position according to FAR 25.1322).

(2)Detection sequence

The detection sequence is composed of three distinct phases :

PHASE	FUNCTION	MEANS OF DETECTION
1	Warning	Aural warning
2	Identification	MASTER lights
3	Isolation	Detailed display (+local lights on control panel)

B. ECAM Data Definition

(1)Lights

The following color coding is established on the basis of FAR 25-1322 recommendations.

INDICATION	COLOR	INTERPRETATION
WARNING	RED	Configuration or failure requiring immediate action
	AMBER	Configuration not requiring immediate action. Time for taking action will be left to the crew's discretion
INDICATION	GREEN	Normal operation
	BLUE	Normal transient configuration
	WHITE	Control position indication Neutralized abnormal configuration

(2)CRT displays
Due to shadow mask CRT displays color coding is implemented with the following general rules :

COLOR	WARNING	SYSTEM
RED	EMERGENCY	EMERGENCY
AMBER	ABNORMAL	ABNORMAL
AMBER	DATA NOT AVAILABLE "NO ACTION FEEDBACK"	DATA NOT AVAILABLE FLAG "XX"
CYAN	ACTION TO BE TAKEN LIMITATIONS AND PROCEDURES	UNITS
WHITE	ACTION PERFORMED	TITLE "ADV" INSCRIPTIONS
GREEN	INFORMATION	NORMAL FUNCTIONING PARAMETERS IN NORMAL RANGE
MAGENTA	LDG INHIB STATUS T.O INHIB	

(3)Aural warnings
Two types of warnings processed by the FWCs are used
- non specific warnings always associated with MASTER lights
- specific warnings associated or not with MASTER lights
(Ref. Fig. 012)

WARNINGS	FWC AURAL WARNINGS	AURAL CANCELLATION
SYSTEM FAILURE AMBER WARNINGS	SINGLE CHIME SC	AUTO
FIRE	CONTINUOUS REPETITIVE CHIME CRC 250ms	NORM CANCEL OR FIRE HANDLE PULLED
SYSTEM FAILURE RED WARNINGS	CONTINUOUS REPETITIVE CHIME CRC	NORM CANCEL
LANDING GEAR	APPROACH : CONTINUOUS REPETITIVE CHIME CRC	NORM CANCEL
	LANDING : CONTINUOUS REPETITIVE CHIME CRC	NIL*
CONFIGURATION	CONTINUOUS REPETITIVE CHIME CRC	NIL*
OVERSPEED	CONTINUOUS REPETITIVE CHIME CRC	NIL*
LANDING CAPABILITY CHANGE	CLICK 3 PULSES	AUTO
AUTO PILOT DISCONNECTION	CAVALRY CHARGE 1 s ON - 3 s OFF	INSTINCTIVE DISCONNECT 1 SEC MIN
CALLS	SELCAL : BUZZER 1 s ON 1 s OFF CABIN : BUZZER	NORM CANCEL AUTO
STALL	CRICKET	NIL*

GPWS	WHOOP WHOOP PULL UP**	NIL*
STAB IN MOTION	WHOOLER**	NIL*

* CAN ONLY BE CANCELLED BY CORRECTIVE ACTION OR BY USE OF THE EMER CANCEL SWITCH
** GENERATED BY DEDICATED UNITS

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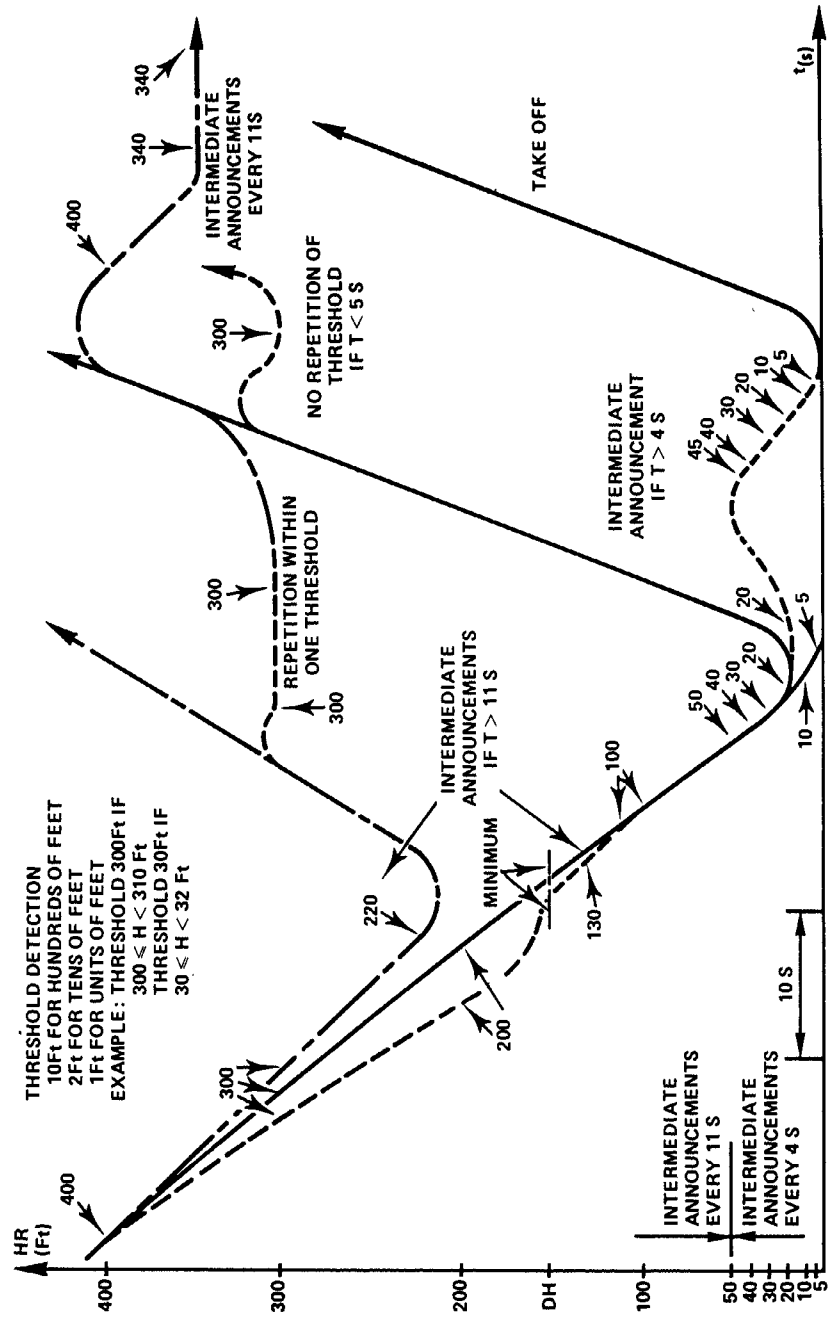
Aural Warnings
Figure 012

(4)Vocal information, Automatic Call-out function :
The Automatic Call-out function, processed in the FWCs, provides vocal radio height (H) information.
The system is operational for radio height lower than 400 ft.
This Automatic Call-out function is inhibited for H ≤ 3ft. and during climbing trajectory.
The radio height vocal information is triggered by the result of the comparison between radio height values and the following memorized values

	Memorized Height Threshold	Vocal Information
R	400	Four Hundred
	300	Three Hundred
R	200	Two Hundred
R	100	One Hundred
	50	Fifty
	40	Forty
	30	Thirty
	20	Twenty
	10	Ten
	5	Five

If a new height threshold detection does not occur Ts after the previous detection, the system provides intermediate height vocal information (T = 4s for H ≤ 50ft and T = 11s for H > 50ft).
Between 100 and 400ft. the height value is rounded off to the lower ten.
To prevent nuisances from ground configuration the 400, 300, 200, 100 thresholds cannot be repeated less than 5 s after a previous emission.
(Ref. Fig. 013)



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Automatic Call-out-Configurations
Figure 013

EFFECTIVITY: 101-200,

R

PIA

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By aircraft wiring, the Automatic Call-out function provides the following possibilities :
- inhibition of any memorized Height Threshold
- "PLUS HUNDRED" 100 ft. above selected DH
- Priority of the ground proximity warning system over the automatic call-out function.

C. Warning Definition

(1)Types of warnings

There are three distinct types of warnings :
- warning associated with an independent failure,
- warning associated with a primary failure,
- warning associated with a secondary failure.

(a)Independent failure

This is a failure which affects an isolated item of equipment or system without affecting the other items of equipment or systems on the aircraft.
e.g. fuel pump failure.

(b)Primary failure

This is a failure of an item of equipment or system causing the loss of other items of equipment on which it depends.
This configuration constitutes a cascade of failures all originating from the same primary failure.
e.g. : ADC 1 failure leads to the loss of :
- pitch trim 1
- yaw damper 1
- ATS OFF
- anemometrics information on Captain's instruments.

(c)Secondary failure

This is the loss of an item of equipment or system resulting from a primary failure.
This apparent failure could, in some cases, disappear after corrective crew action.
e.g. loss of a fuel pump resulting from a power supply busbar failure, cured by electric transfer.
NOTE : Different failures combination may occur sequentially or simultaneously.

(2)Warning Levels

System operation complies with ARP 450 D.
In order to achieve this, the warnings are classified in 4 levels according to the importance and urgency of the corrective action required.

(a)Level 3

This corresponds to an emergency configuration
Corrective or palliative action must be taken immediately by the crew.
The following warnings fall into this category :
- aircraft in dangerous configuration or limit flight conditions,
- system failure altering the flight conditions,
- serious system failure.

These warnings are provided by a continuous repetitive chime (CRC) or by specific aural warnings and illuminate the MASTER WARN lights above all (+local lights on the overhead panel).

They lead to a display on the CRT above all.

(b)Level 2

This corresponds to an abnormal configuration of the aircraft.
Immediate corrective action is not required.
The crew must decide how soon action has to be taken.
This level mainly comprises :
- system failures having no direct consequences on safety.
These warnings are identified by MASTER CAUTION lights (and Local lights on the overhead panel) and are provided at the same time as a single chime (SC).
They lead to a display on the CRT.

(c)Level 1

This corresponds to a warning configuration requiring crew monitoring ; that is, mainly failures leading to a loss of redundancy or degradation of a system.
These warnings are sometimes identified by amber local lights on control panels without a chime. They lead to a display on the CRT.

(d)Level 0

This corresponds to an information configuration and requires no special action.
This configuration is provided by blue, green and white local lights on the control panels.

NOTE : Level 3 has priority over level 2 which in turn has priority over level 1.
An order of priority between warnings is also defined within each level as follows :

	WARNING	MASTER WARN	AURAL WARNING	CRT DISPLAYS PRESENTATION	PILOT ACTION
	1 - STALL WARNING	NO	CRICKET	No (Stick shaker)	I
	- OVERSPEED	YES	CRC	Warning message only	M
	- T.O CONFIG	YES	CRC	Warning message only	M
	2 - ENGINE FIRE	YES	CRC	Message + synoptic	E
L				diagram	D
E	3 - APU FIRE	YES	CRC	Message + synoptic	I
V				diagram	A
E	4 - ENG OIL LO	YES	CRC	Message + synoptic	T
L	PRESS			diagram	E
	5 - EXCESSIVE CABIN	YES	CRC	Message + synoptic	
3	ALT.			diagram	A
	6 - SMOKE	YES	CRC	Message + synoptic	C
				diagram	T
	7 - DUAL HYD	YES	CRC	Message + synoptic	I
	FAILURE			diagram	O
	8 - DUAL SERVO	YES	CRC	Message + synoptic	N
	FAILURE			diagram	
	9 - AUTOPILOT	YES	cavalry	Warning message only	
	FAILURE		charge		
	10 AUTOLAND	NO	click 3	No (local warning	

	WARNING	MASTER WARN	AURAL WARNING	CRT DISPLAYS PRESENTATION	PILOT ACTION
			pulses	light)	
	11 - LANDING GEAR	YES	CRC	Warning message only	
	12 - EXCESS AFT CG	YES	CRC	Message + Synoptic diagram	

NOTE : The three first warnings (1) never occur simultaneously.
Level 3 warnings are always associated with an independent failure (except dual servo-controls and dual hydraulic failures).

		WARNING	MASTER CAUTION	AURAL WARNING	PILOT ACTION
		FWS	YES	SC	IMMEDIATE ATTENTION
		ENGINE	YES	SC	IMMEDIATE ATTENTION
		HYDRAULICS	YES	SC	IMMEDIATE ATTENTION
		ELECTRICS	YES	SC	IMMEDIATE ATTENTION
	L	SERVO CONTROLS	YES	SC	IMMEDIATE ATTENTION
	E	APU	YES	SC	IMMEDIATE ATTENTION
	V	NAV ADC	YES	SC	IMMEDIATE ATTENTION
	E	FLIGHT CONTROLS	YES	SC	IMMEDIATE ATTENTION
	L	ATS	YES	SC	IMMEDIATE ATTENTION
		BRAKES	YES	SC	IMMEDIATE ATTENTION
	2	LANDING GEAR - WHEEL	YES	SC	IMMEDIATE ATTENTION
		FUEL	YES	SC	IMMEDIATE ATTENTION
		AIR BLEED	YES	SC	IMMEDIATE ATTENTION
		ANTI ICE	YES	SC	IMMEDIATE ATTENTION
		AIR CONDITIONING/CABIN PRESS	YES	SC	IMMEDIATE ATTENTION
		DOORS	YES	SC	IMMEDIATE ATTENTION
		LOOPS	YES	SC	IMMEDIATE ATTENTION
	L E V E L 1	Same priority order as level 2 warnings	NOTHING	NOTHING	ATTENTION
	L E V E L	Same priority order as level 1 and 2 warnings	NOTHING	NOTHING	INFORMATION

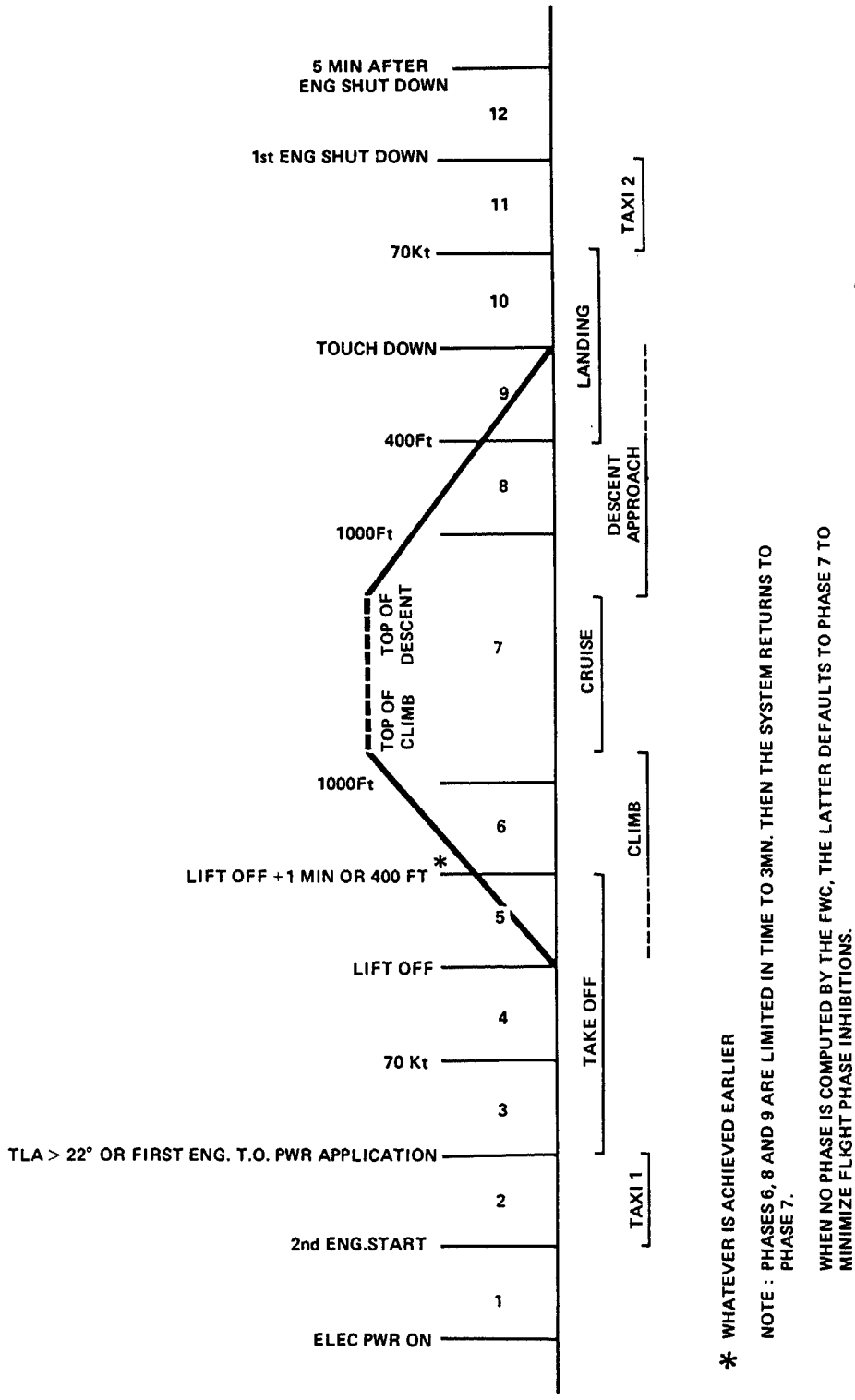
		WARNING	MASTER CAUTION	AURAL WARNING	PILOT ACTION
R	0				

NOTE : Level 2 warnings can be associated with independent, primary or secondary failures.
Level 1 warnings can be associated with independent or secondary failures. Level 0 warnings are always of independent type.

D. Warning Inhibition
In order to avoid warnings when not desired, inhibition follows the rules hereafter :
- ensure proper warnings only when necessary ; a warning or indication which has no signification on a given configuration is not activated. (e.g. hydraulic low pressure warning is inhibited before engine starting)
- avoid warnings without interest for a flight phase.
An inhibition logic filters the presentation of warnings according to the flight phase.
(Ref. Fig. 014)

E. Clear and Recall Function
The clear function allows the crew to clear warning presentation when corrective actions have been performed. This function is triggered from the ECAM Control Panel - (Ref. para 5.J.). The recall facility allows the crew to reactivate the presentation of a warning inhibited by the flight phase or previously cleared (if warning condition is still present).
NOTE : 1 - Pressing the **INHIB OVRD P/B** switch on the **ECAM** maintenance panel cancels the warning inhibition during flight phases 1 and 12. The **INHIB OVRD** mode is self maintained until either a new flight phase is computed or if all warnings have been cleared.
2 - Without any recall action, a cleared warning can be redisplayed if the warning condition disappears and then appears again. This could lead to an operational nuisance, the emergency cancel function enables this to be prevented (Ref. para. 5. G).
3 - Once the **RCL P/B** switch is pressed, the inhibition of warnings by the current flight phase is cancelled. Furthermore, **LDG INHIB** or **T.O.INHIB** message, if present, disappears.

F. **MASTER** Lights and Aural **NORM** Cancel Function
Red **MASTER WARN** and amber **MASTER CAUTION** lights are installed on the Captain and First Officer instrument panels.
(Ref. Fig. 006). They receive control signals from the two **FWC**s as follows :
- level 3 warnings control the **MASTER WARN** lights
- level 2 warnings control the **MASTER CAUTION** lights
In the event of a level 3 warning, action on the **MASTER WARN** light will extinguish these lights and stop, in the same way as action on **NORM CANCEL**



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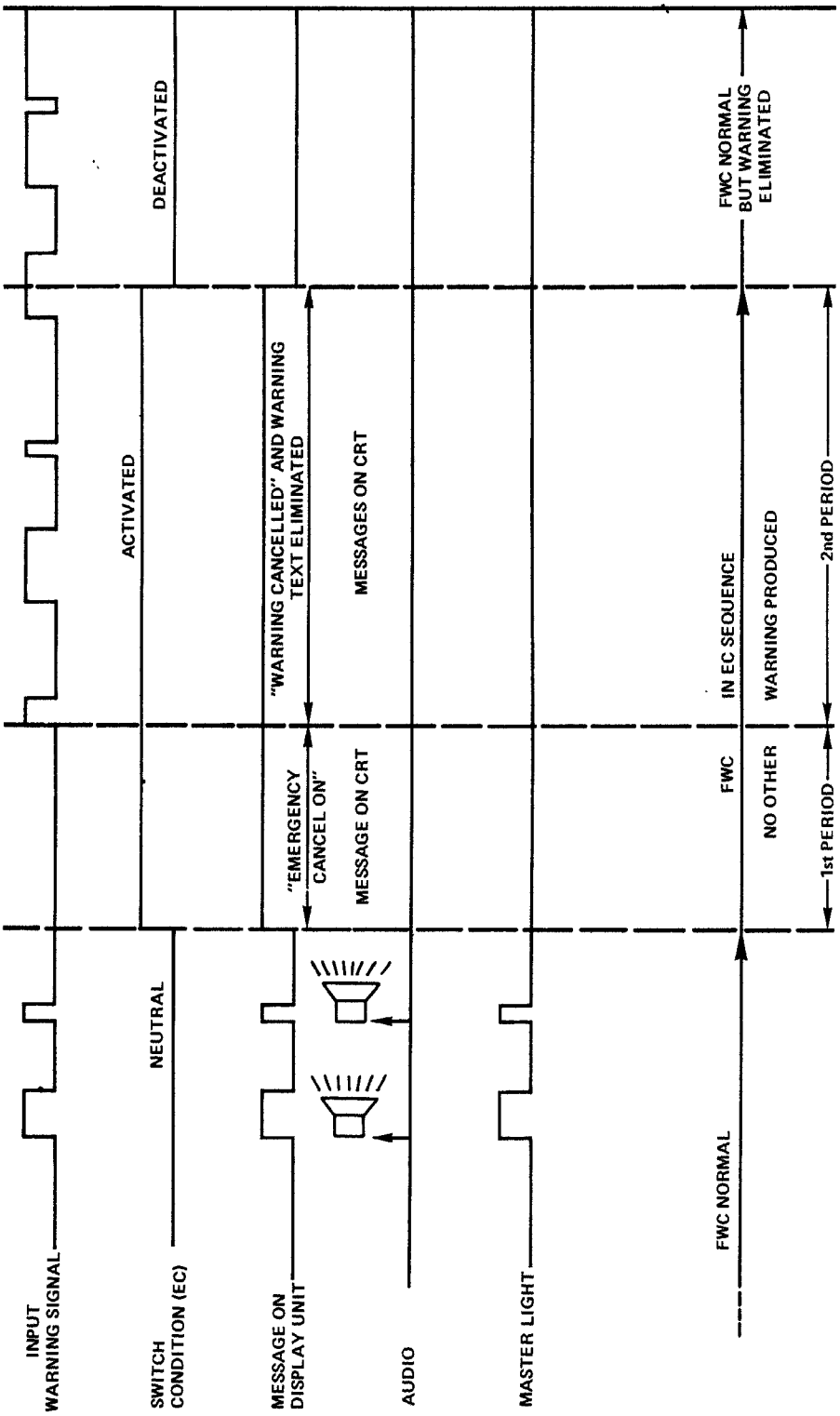
Flight Phase Definition
Figure 014

P/B switch (Ref. Fig. 009), the aural warning if its cancellation is authorized by the official rules :
- FIRE ENG1, ENG2, APU
- SMOKE
- ENG1 (2) OIL LO PR
- Excess Altitude
- Dual HYD Failure
- Dual SERVO Failure
- Landing gear not extended during the approach phase.
- Excess AFT CG

In the event of a level 2 warning, action on the MASTER CAUTION light will extinguish these lights.
These cancel actions have no effect on CRT messages, they simply suppress the aural and visual distractions.

G. Emergency Cancel Function
This function is activated by a guarded sealed EMER CANCEL switch at the rear of the center pedestal (Ref. Fig. 009), and enables cancellation of amber warning (CRT display, sound and MASTER lights; of course local lights on control panels are not affected).
It acts in such a way as to ensure that once a warning is cancelled it remains cancelled even if the warning condition disappears and re-appears
The following figure (Ref. Fig. 015) shows the operation of this function.
CRT messages are given to indicate that the switch is activated "EMER CANCEL ON" and that the specific warning is cancelled ("CANCELLED WARNING" followed by the entire text of the cancelled warning).
Selection of the specific warning is achieved by ensuring that the EMER CANCEL switch button is activated when the nuisance fault condition is present.
This function allows suppression of random and repetitive warnings (due to sensor failures ...) which could cause a considerable operational nuisance.
This cancel facility can be manually reset by pressing the RCL P/B switch on ECAM control panel for more than 3 s. Automatic reset occurs at the beginning of flight phase 1 or 12. Action on the EMER CANCEL switch allows cancellation of the warning displayed on the top of CRT. Another action is necessary to cancel another warning.
For red warning the EMER CANCEL switch acts as audio emergency cancel, i.e. only aural warnings can be cancelled and if, for instance the red warning condition disappears and re-appears the associated aural warning is produced again.



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Emergency Cancel Function
Figure 015

H. Warning Distribution

The distribution of the different warnings between the two Flight Warning Computers enables segregation of the aircraft systems to be kept without affecting the detection of red warnings :

- Both computers receive all the signals required for generating level 3 warnings.
- For the other levels of warnings, each computer receives half of the required signals directly while the other half is transmitted by the other computer through an exchange bus.
- If only one computer is operating : (Aural warning provided if warning is processed).
  . All red warnings are processed, displayed on CRT and illuminate the MASTER WARN lights
  . Some of the amber warnings are processed and illuminate the MASTER CAUTION lights. (Only for level 2 warnings).

  Nevertheless these processed warnings lead to an indication on the CRT. These indications provide the type of failure. (Ref. Fig. 016).
- The tables hereafter give the distribution of warnings processed by each of the two FWCs when they are operating on their own.

(1)Warnings acquired by either FWC1 or FWC2 (i.e warnings which operate normally whatever the FWC remaining)

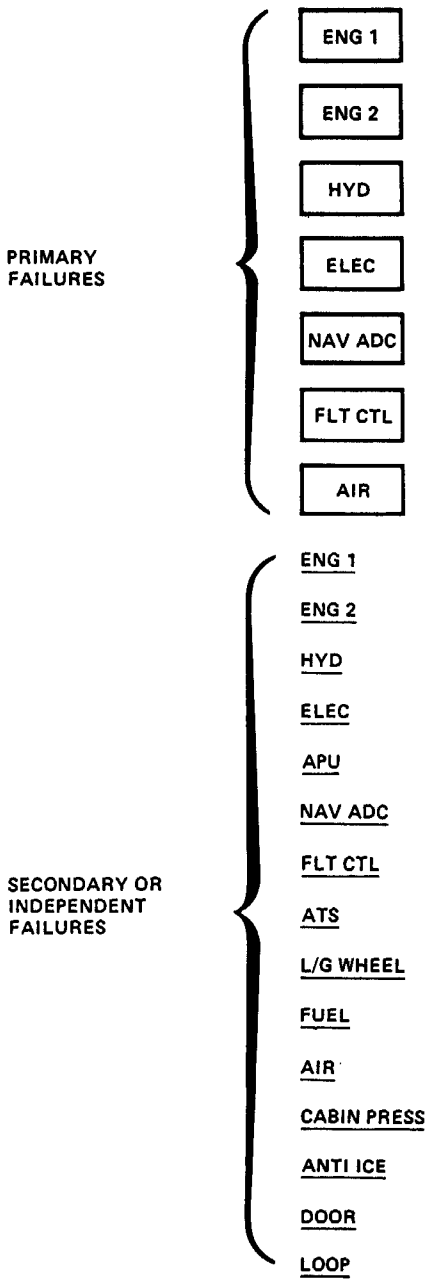
(a)Red warnings displayed on CRT and illuminating of the MASTER WARN lights.

OVERSPEED VFE, VLE, VMO/MMO
TO CONFIG SLATS/FLAPS/PITCH TRIM/SPD BRK/PARKING BRK
FIRE ENG1, ENG2, APU
ENG1 (2) OIL LO PR
EXCESS ALT
SMOKE AVIONICS/MAIN BAY/BAT/AFT, FWD, BULK COMPT/LAVATORY
DUAL HYD FAILURE
DUAL SERVO FAILURE
L/G NOT DN
AP OFF (red)
EXCESS AFT CG

(b)Warnings without CRT message and MASTER lights not on.

R AUTOLAND (red) :
R BEAM DEV/LONG FLARE/DRIFT LOC BEAM/Below 200Ft AP OFF, RA DISCREPANCY
R STALL WARNING : Specific Aural Warning
R LAND CAPABILITY CHANGE : Specific Aural Warning
R ALTITUDE ALERT (amber) : Specific Aural Warning
R DECISION HEIGHT (amber) : Specific Aural Warning
SELCAL/CABIN CALL OR MECHANICAL CALL/EVAC SYSTEM

(c)Amber warning illuminating the MASTER CAUTION lights and leading to an indication on the CRT (Ref. Fig. 016) when only one computer is operating.



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Amber Warnings in Degraded Operation
Figure 016

HEADER	ASSOCIATED MESSAGE
FWS	(NOTE : Title on CRT when only one computer is operating.)
	FWC1 or 2 FAULT
	CRT AMBER CAUTION NOT AVAIL
	AMBER WARN - DEGRADED OPER
	AURAL WARN NOT AVAIL
ENG1 (2)	ENG1(2) FAIL
	ENG1(2) SHUT DOWN
	ENG TRIM FAULT
HYD	HYD PUMP LO PR B/G(1+2)/Y
	HYD SYS LO PR B/G/Y
FLT CTL	SERVO LO PR B/G/Y
	GND SPLR NOT EXTENDED
	FLAPS VANE JAM RETRACT/EXTEND
	KRUGER NOT RETRACTED/NOT EXTENDED
ELEC	AC BUS 2 OFF
ATS	ATS OFF (one TCC)
ANTI ICE	STBY STAT HEAT FAULT
NAV ADC	EFIS SGU3 FAULT
	HDG/ATT DISCREPANCY
	CAPT-F/O ON SAME SOURCE
	RADIO HEIGHT CALL OUT
L/G WHEEL	ANTI SKID FAULT (NORM)
	BRK TEMP HI
	L/G NOT LOCKED UP/DN
	L/G POS DET SYS FAULT SYS1/SYS2
FUEL	AUTO FUEL FEED FAULT CTR/INR TK
	TRIM TK SYS FAULT
LOOP	ENG1(2)/APU LOOP A/B FAULT
	FWD/AFT/BULK COMPT LOOP A/B FAULT
	DISCH AGENT 2

If SDAC available only :

HEADER	ASSOCIATED MESSAGE
DOOR	L(R) FWD/AFT CABIN NOT CLOSED
	EXT AVIONICS NOT CLOSED
	FWD/AFT/BULK CARGO NOT CLOSED

HEADER	ASSOCIATED MESSAGE
	L(R) EMER EXIT NOT CLOSED
	L(R) FWD COMPT NOT CLOSED
	UPPER CARGO NOT CLOSED
	LOWER ACCESS DOOR NOT CLOSED

(2)Warnings requiring FWC1 and FWC2 acquisition
(i.e not processed when failure of any FWC)
APU FAULT EMER/SHUT DN
APU FLAP FAULT
ADC 1 + 2 FAULT
ILS 1 + 2 FAULT
RA 1 + 2 FAULT
SPOILER RA OUTPUT
FLAPS (SLATS) SYS 1 + 2 FAULT
FLAPS (SLATS) STUCK
PITCH FEEL 1 + 2 FAULT
PITCH FEEL IN HI SPEED
RUD TRV 1 + 2 FAULT
RUD TRV IN HI SPD
PITCH TRIM 1 + 2 OFF
YAW DAMPER 1 + 2 OFF
ATS 1 + 2 FAULT (DUAL TCC)
L/G LEVER INTERLOCKED
L/G RETRACTION FAULT
L/G DOORS NOT CLOSED
L/G DOORS SYS FAULT
CTR TK L+R PUMP FAULT
TRIM TK PUMP 1 + 2 LO PR
L + R OUTR TK LO LEVEL
PACK 1 + 2 FAULT
CAB PRESS REG 1 + 2 FAULT
YELLOW RUD SERVO JAM
YELLOW L ELEV SERVO JAM
YELLOW L AIL SERVO JAM
GREEN RUD SERVO JAM
GREEN L ELEV SERVO JAM
GREEN L AIL SERVO JAM
BLUE R ELEV SERVO JAM
BLUE R AIL SERVO JAM

(3)Warning acquired by only one FWC
(i.e processed and leading to an indication on CRT (Ref. Fig. 013)
when corresponding FWC is available.
* Title on CRT when only one computer is operating

FWC1		FWC2	
HEADER	ASSOCIATED MESSAGE	HEADER	ASSOCIATED MESSAGE
* ENG1	N1, N2, EGT OVER LIMIT	ENG 2	N1, N2, EGT OVER LIMIT
	OIL HI PR		OIL HI PR
	OIL FILTER CLOG		OIL FILTER CLOG
	REVERSE UNLOCKED		REVERSE UNLOCKED
	FUEL FILTER CLOG		FUEL FILTER CLOG
	TURB CASE COOL OPEN/		TURB CASE COOL OPEN/
	CLOSED		CLOSED
ENG1(2)	FUEL HEATER FAULT	ENG1(2)	FUEL HEATER FAULT (VALVE
			DISAGREE)
HYD	BLUE RSVR LO AIR PR	HYD	YELLOW RSVR LO AIR PR
	GREEN RSVR LO AIR PR		YELLOW RSVR LO LVL
	BLUE RSVR LO LVL		GREEN RSVR LO LVL
	GREEN RSVR OVHT		YELLOW RSVR OVHT
	BLUE RSVR OVHT		GREEN ELEC PUMPS LO PR
ELEC	IDG1 OIL LO PR	ELEC	GEN LOAD HI
	IDG1 OIL OVHT		IDG2 OIL LO PR
	GEN 1 FAULT		IDG2 OIL OVHT
	APU GEN FAULT		GEN2 FAULT
	AC ESS BUS OFF		DC ESS BUS ON BAT
	AC EMER BUS OFF		BAT 2 OVHT
	AC BUS 1 OFF		DC NORM BUS OFF
	BAT 1 OVHT		
	BAT 3 OVHT		
APU	APU FAULT : AUTO SHUT DN	APU	YELLOW RSVR LO AIR PR
	FUEL LO PR		
NAV ADC	ADC 1 FAULT	NAV ADC	ADC2 FAULT
	IRS 1 FAULT		IRS2 FAULT
	IRS 3 FAULT		ILS1 FAULT
	ILS 2 FAULT		RA2 FAULT
	RA 1 FAULT		F/O ALTI FAULT
	CAPT ALTI FAULT		F/O VSI FAULT
	CAPT VSI FAULT		
FLT CTL	BLUE RUD SERVO JAM	FLT CTL	YELLOW STAB SERVO JAM
	BLUE L AIL SERVO JAM		YELLOW R AIL SERVO JAM
	BLUE L ELEV SERVO JAM		YELLOW R ELEV SERVO JAM
	FLAPS (SLATS) SYS1 FAULT		GREEN STAB SERVO JAM

FWC1		FWC2	
HEADER	ASSOCIATED MESSAGE	HEADER	ASSOCIATED MESSAGE
	PITCH FEEL 1 FAULT		GREEN R AIL SERVO JAM
	RUDDER TRV 1 FAULT		GREEN R ELEV SERVO JAM
	SPLR 7/6/3 + 2/FAULT		FLAPS (SLATS) SYS2 FAULT
	PITCH TRIM 1 OFF		PITCH FEEL 2 FAULT
	YAW DAMPER 1 OFF		RUDDER TRV 2 FAULT
			SPLR 5/4 + 1 FAULT
			PITCH TRIM 2 OFF
			YAW DAMPER 2 OFF
ATS	ATS 1 OFF (DUAL TCC)	ATS	ATS 2 OFF (Dual TCC)
L/G WHEEL	ANTI SKID FAULT (ALTN)	L/G WHEEL	ANTI SKID OFF
	AUTO BRK FAULT		TIRE LO PRESS
FUEL	CTR TK EMPTY	FUEL	
	CTR TK L PUMP FAULT		CTR TK R PUMP FAULT
	L INR TK PUMP 1 FAULT		R INR TK PUMP 1 FAULT
	L INR TK PUMP 2 FAULT		R INR TK PUMP 2 FAULT
	L INR TK PUMP 1+2 FAULT		R INR TK PUMP 1+2 FAULT
	L INR TK EMPTY		R INR TK EMPTY
	L OUTR TK PUMP 1 FAULT		R OUTR TK PUMP 1 FAULT
	L OUTR TK PUMP 2 FAULT		R OUTR TK PUMP 2 FAULT
	L OUTR TK PUMP 1+2 FAULT		R OUTR TK PUMP 1+2 FAULT
	L TK LO LVL		R TK LO LVL
	TRIM TK PUMP 1 LO PR		TRIM TK PUMP 2 LO PR
	ZFW OR ZFCG DISAGREE		TRIM TK EMPTY
			TRIM TK SYS FAULT
			(TT EMPTY)
			CGCC ALTERNATE MODE
AIR BLEED	ENG1 HP VALVE FAULT	AIR BLEED	ENG2 HP VALVE FAULT
	ENG1 HP VALVE STUCK		ENG2 HP VALVE STUCK OPEN
	OPEN		BLEED VALVE 2 FAULT
	BLEED VALVE 1 FAULT		BLEED 2 LEAK
	BLEED 1 LEAK		
	APU BLEED LEAK		
	AIR X FEED FAULT		
ANTI ICE	ICE DETECTED	ANTI ICE	ICE DET OVHT
	ENG1 NAC VALVE NOT CLOSED		ENG 2 NAC VALVE NOT CLOSED
	ENG1 NAC VALVE NOT OPEN		ENG 2 NAC VALVE NOT OPEN
	L WING VALVE NOT CLOSED		R WING VALVE NOT CLOSED
	L WING VALVE NOT OPEN		R WING VALVE NOT OPEN
			F/O PITOT OVHT
			F/O PITOT HEAT OFF
			F/O PROBES HEAT OFF

FWC1		FWC2	
HEADER	ASSOCIATED MESSAGE	HEADER	ASSOCIATED MESSAGE
	CAPT PITOT OVERHEAT		
	CAPT PROBES HEAT OFF		
	CAPT ALPHA HEAT FAULT		F/O ALPHA HEAT FAULT
	CAPT TAT HEAT FAULT		F/O TAT HEAT FAULT
	CAPT STAT HEAT FAULT		F/O STAT HEAT FAULT
	CAPT PITOT HEAT FAULT		F/O PROBES HEAT FAULT
	ENG1 EPR HEAT FAULT		ENG2 EPR HEAT FAULT
	STBY PITOT HEAT FAULT		STBY ALPHA HEAT FAULT
	STBY PITOT OVERHEAT		R WINDOW HEAT FAULT
	STBY PROBES HEAT OFF		
	L WINDOW HEAT FAULT		
AIR	PACK 1 FAULT	AIR	PACK 2 FAULT
	MID CAB HOT AIR OVHT		FWD CAB HOT AIR OVHT
	CKPT HOT AIR OVHT		AFT CAB HOT AIR OVHT
	BULK CARGO HOT AIR OVHT		FWD CARGO HOT AIR OVHT
	VENT OVBD VALVE FAULT		VENT EXTRACT LO FLOW
			BULK CARGO ISOL VALVE
			FAULT
	VENT BLOWERS LO FLOW		BULK CARGO COOL VALVE
	FWD CARGO ISOL VALVE		FAULT
	FAULT		
	GND COOL VALVE OPEN		
	FWD CARGO COOL VALVE		
	FAULT		
CABIN PRESS	OUTFLOW VALVE 1 FAULT	CABIN PRESS	OUTFLOW VALVE 2 FAULT
	CAB PRESS REG 1 FAULT		CAB PRESS REG 2 FAULT
			CAB PRESS LO ΔP
	MAN PRESS VALVE NOT		
	CLOSED		
	MAN PRESS VALVE NOT OPEN		
DOOR	FWD CARGO SW FAULT	DOOR	AFT CARGO SW FAULT
	NOTE : If SDAC FAIL only		NOTE : If SDAC FAIL only
	EXT AVIONICS NOT CLOSED		
	L FWD CABIN NOT CLOSED		R FWD CABIN NOT CLOSED
	L MID CABIN NOT CLOSED		R MID CABIN NOT CLOSED
	L AFT CABIN NOT CLOSED		R AFT CABIN NOT CLOSED
	FWD CARGO NOT CLOSED		AFT CARGO NOT CLOSED
			BULK CARGO NOT CLOSED
	L FWD COMPT NOT CLOSED		R FWD COMPT NOT CLOSED
	L EMER EXIT NOT CLOSED		R EMER EXIT NOT CLOSED
			LOWER ACCESS DOOR NOT
			CLOSED

J. ECAM Control Panel

(Ref. Fig. 007)
The ECAM control panel includes all the controls required for operation of the ECAM system.
It consists of :

(1) Two control switches which enable each ECAM display unit to be switched on and the brightness of the images to be adjusted.

(2) Two ECAM SGU P/B switches for control and indication of the symbol generator units 1 and 2. These P/B switches are normally pushed in with legends off. In the event of SGU failure, FAULT legend comes on. The P/B switch has to be released to switch off the faulty SGU. The OFF legend comes on.

(3) Twelve system P/B switches which allow the manual selection of system synoptic diagram display. When a system is selected P/B switch light comes on. The P/B switches are provided with integral lighting enabling selection by night.

(4) Three control P/B switches :

(a) CLR P/B switch which enables (clear function) by pressing it when CLR LT is on
- to clear the warnings chapter by chapter and the associated MASTER lights when all warnings are cleared.
- to transit to the second part of the message when there is an overflow on CRT.
- to transit from one page to another (Ref. para K).

(b) RCL P/B switch which enables (recall function) by pressing it suppression of a warning inhibition due to the CLEAR function or the flight phase.
- Action on RCL P/B switch, for more than 3s, resets the Emergency cancel function ; so all previous cancellations disappear. Moreover when a warning is inhibited by flight phase, action on RCL P/B switch illuminates the MASTER lights associated with this warning if this warning has not been cleared.

(c) STS P/B switch which enables the aircraft status page (Ref. para K (1)) to be called manually. No status function during flight phases 1 and 12.

K. L ECAM Display Unit

(1)Normal Display

In normal operation (without display unit failure), the L ECAM display unit presents one of the following messages.

(a)Warning (logic processed by the FWCs) - Page 1 and 2.

- presentation of an independent failure or primary failure : (according to the priority) only on page 1 of L ECAM display unit
- presentation of secondary failure : (according to the priority) only on page 2 of L ECAM display unit

(b)Status (logic processed by the FWCs) - STATUS page.

- an operational summary of the aircraft condition,
- an explanation of possible autoland capability downgrading,
- indications, as far as possible, of the aircraft status following all failures except those that do not affect the flight,
- general contents and organization :
  . emergency procedures (LAND ASAP, ...),
  . landing capability,
  . limitations (speed, altitude ...),
  . postponable procedures displayed or not on first page,
  . systems/functions lost,
  . information.

(c)Memo (logic processed by the SGU) - MEMO page

Reminder of functions/systems which are temporarily used.

NOTE : . In case of L ECAM display unit failure : (a), (b) and (c) can be displayed on the R ECAM display unit (Ref. Para. 7. E).
. In case of failure of one FWC, the processed status are displayed.

(2)Messages presentation (logic processed by the SGU)

(a)General

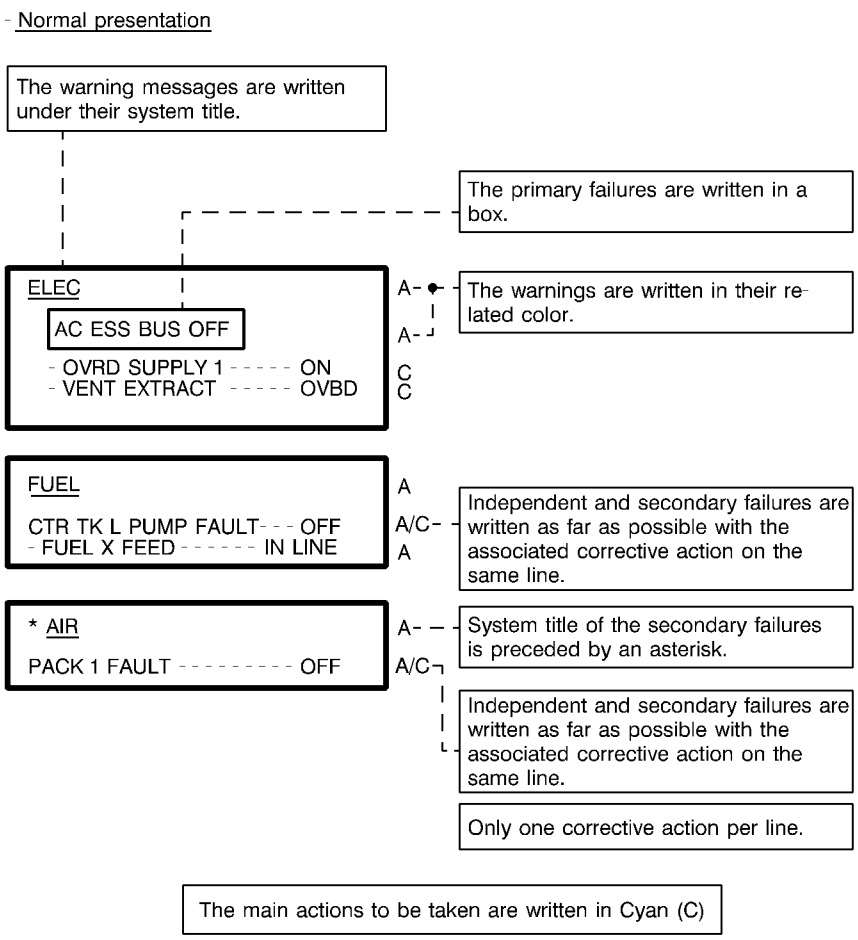
- Wording and abbreviations are consistent with the overhead panel ;
- All secondary failures are listed following normal overhead panel scanning :
  i.e. from the left to the right and from the lower section to the upper section for each column of the overhead panel.
- The action OFF or OFFR always written in accordance with the overhead panel.

(b)Warning messages
R (Ref. Fig. 017)
R (c)STATUS messages
R e.g. : dual G + Y hydraulic
R system low pressure :
R (Ref. Fig. 018)
R (d)MEMO messages
R (Ref. Fig. 019)

The complete list of MEMO items is :
- CAB PRESS MAN CTL
- IRS IN ALIGN
- TAT IN FREQUENT ICING RANGE
- ENG ANTI ICE ON
- WING ANTI ICE ON
- APU RUNNING
- CONTINUOUS RELIGHT ON
- SEAT BELTS ON
- NO SMOKING ON
- FUEL FEED MAN CTL
- CTR TANK FEEDING
- FUEL X FEED
- PARKING BRAKE ON
- EXT PWR CONNECTED
- SPEED BRAKES EXTENDED (Pulsing if THROTTLES NOT AT IDLE)
- LDG LIGHT EXTENDED
- ECON FLOW SELECTED
- MAX COOL ON

R
R TAT, CG, FUEL TK TEMP, GW and T.Fuel information displayed at the
R bottom of the page.
R (Ref. Fig. 020)

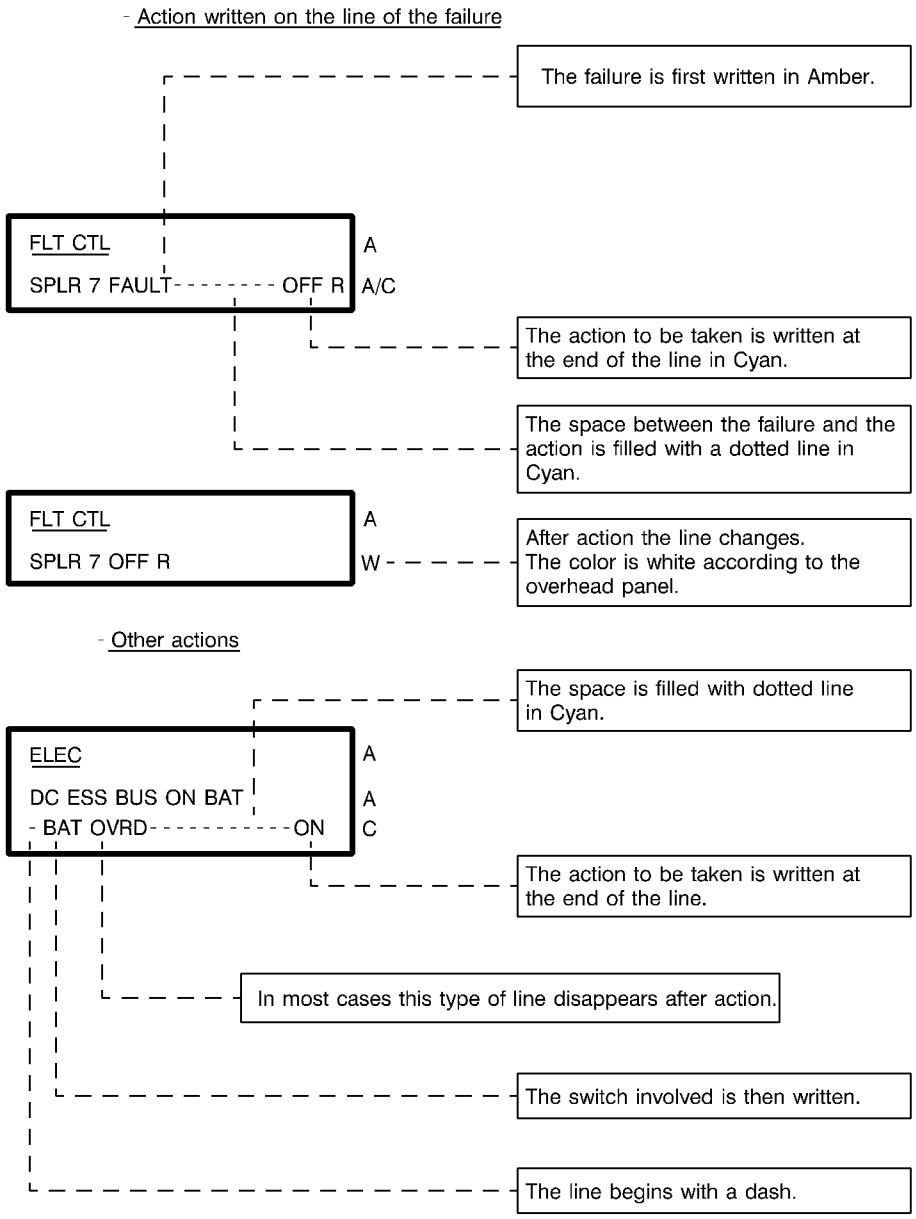
(3)Messages display operational mode
(a)Automatic mode related to a failure
(Ref. Fig. 021, 022, 023)
(Ref. Fig. 024)
(Ref. Fig. 025)
(Ref. Fig. 026)
(Ref. Fig. 027)
(Ref. Fig. 028)
As soon as a warning is detected by the FWC, the L ECAM display unit automatically shows the first warning page.
In case of primary failure, the crew can manually select the secondary failures which are displayed on the second page by pressing the CLR P/B switch on the ECAM control panel.
The warning message is cleared and STATUS page is displayed automatically during flight (or MEMO if no status message) when the failure disappears or when the CLR P/B switch is pressed again.
(b)STATUS mode
(Ref. Fig. 029)
This mode allows the crew to know the operational status of the


- Normal presentation
The warning messages are written under their system title.
The primary failures are written in a box.
ELEC
AC ESS BUS OFF
- OVRD SUPPLY 1 ----- ON
- VENT EXTRACT ----- OVBD
A-
A-
C
C
The warnings are written in their related color.
FUEL
CTR TK L PUMP FAULT--- OFF
- FUEL X FEED ------ IN LINE
A
A/C-
A
Independent and secondary failures are written as far as possible with the associated corrective action on the same line.
* AIR
PACK 1 FAULT --------- OFF
A- -
A/C
System title of the secondary failures is preceded by an asterisk.
Independent and secondary failures are written as far as possible with the associated corrective action on the same line.
Only one corrective action per line.
The main actions to be taken are written in Cyan (C)

BM5 31 51 00 0 DAAA 00

Warning Messages (Sheet 1)
Figure 017

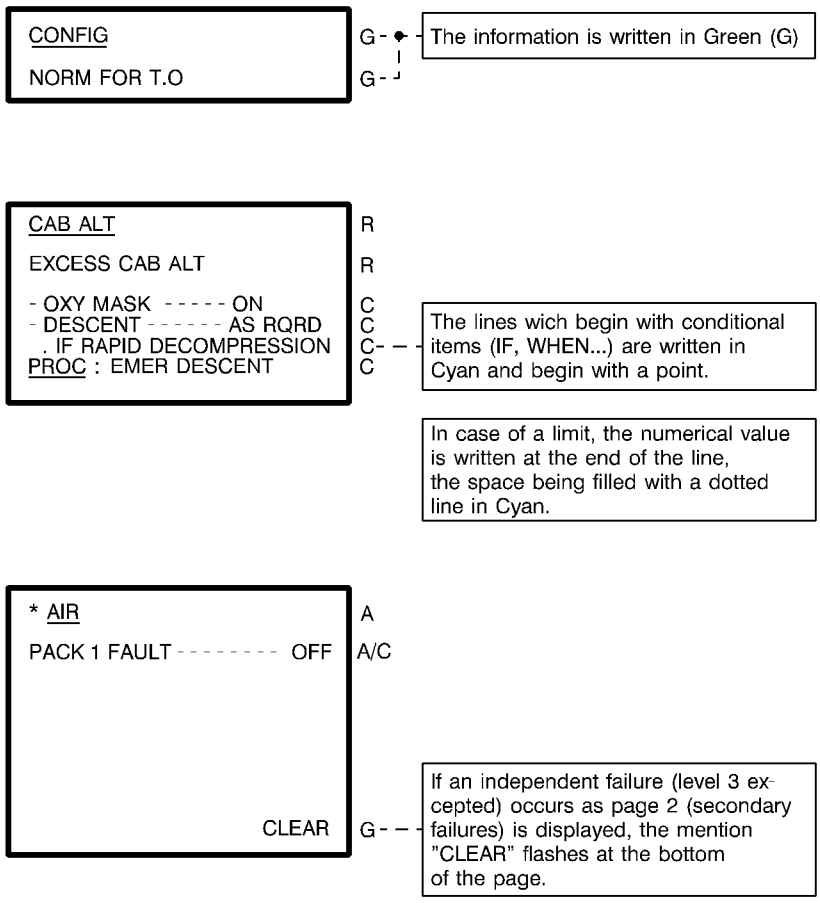
R


- Action written on the line of the failure
The failure is first written in Amber.
FLT CTL
SPLR 7 FAULT
OFF R
A
A/C
The action to be taken is written at the end of the line in Cyan.
The space between the failure and the action is filled with a dotted line in Cyan.
FLT CTL
SPLR 7 OFF R
A
W
After action the line changes. The color is white according to the overhead panel.
- Other actions
The space is filled with dotted line in Cyan.
ELEC
DC ESS BUS ON BAT
- BAT OVRD
ON
A
A
C
The action to be taken is written at the end of the line.
In most cases this type of line disappears after action.
The switch involved is then written.
The line begins with a dash.

BM5 31 51 00 0 DAAJ 00

Warning Messages (Sheet 2)
Figure 017

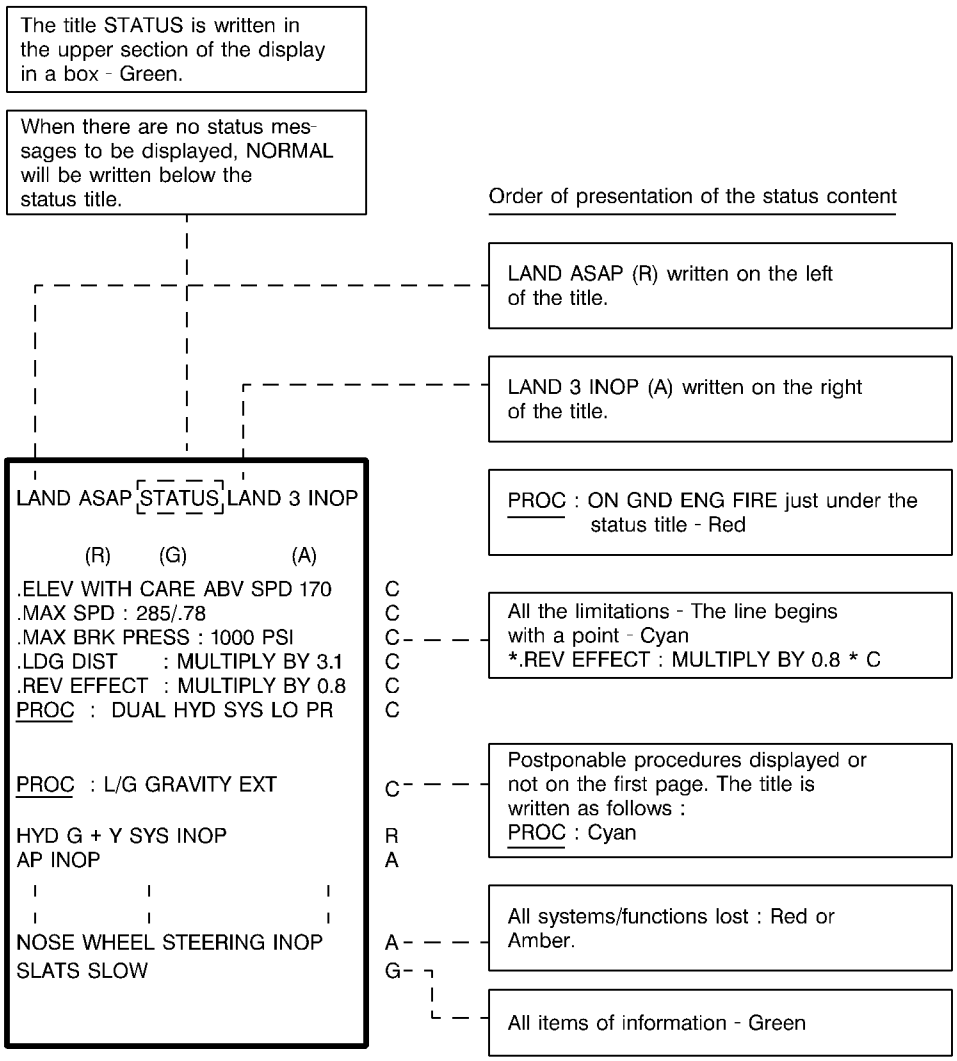
R


CONFIG
NORM FOR T.O
G
G
The information is written in Green (G)
CAB ALT
EXCESS CAB ALT
- OXY MASK ----- ON
- DESCENT ------ AS RQRD
. IF RAPID DECOMPRESSION
PROC : EMER DESCENT
R
R
C
C
C
C
The lines wich begin with conditional items (IF, WHEN...) are written in Cyan and begin with a point.
In case of a limit, the numerical value is written at the end of the line, the space being filled with a dotted line in Cyan.
* AIR
PACK 1 FAULT -------- OFF
CLEAR
A
A/C
G
If an independent failure (level 3 excepted) occurs as page 2 (secondary failures) is displayed, the mention "CLEAR" flashes at the bottom of the page.

BM5 31 51 00 0 DAAS 00

Warning Messages (Sheet 3)
Figure 017

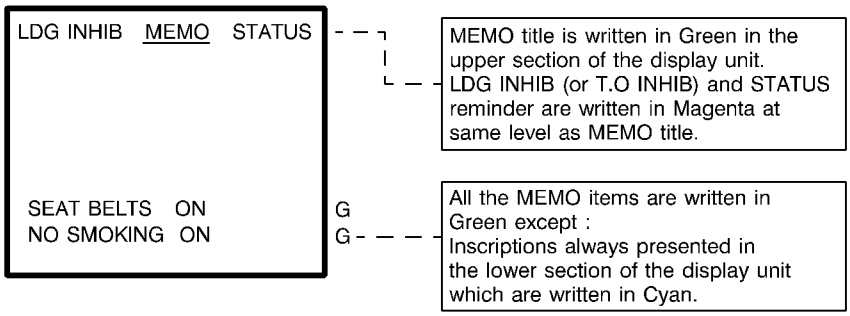
R


The title STATUS is written in the upper section of the display in a box - Green.
When there are no status messages to be displayed, NORMAL will be written below the status title.
Order of presentation of the status content
LAND ASAP (R) written on the left of the title.
LAND 3 INOP (A) written on the right of the title.
PROC : ON GND ENG FIRE just under the status title - Red
All the limitations - The line begins with a point - Cyan
*.REV EFFECT : MULTIPLY BY 0.8 * C
Postponable procedures displayed or not on the first page. The title is written as follows :
PROC : Cyan
All systems/functions lost : Red or Amber.
All items of information - Green
LAND ASAP STATUS LAND 3 INOP
(R) (G) (A)
.ELEV WITH CARE ABV SPD 170 C
.MAX SPD : 285/.78 C
.MAX BRK PRESS : 1000 PSI C
.LDG DIST : MULTIPLY BY 3.1 C
.REV EFFECT : MULTIPLY BY 0.8 C
PROC : DUAL HYD SYS LO PR C
PROC : L/G GRAVITY EXT C
HYD G + Y SYS INOP R
AP INOP A
NOSE WHEEL STEERING INOP A
SLATS SLOW G

BM5 31 51 00 0 DBA0 00

STATUS Messages
Figure 018

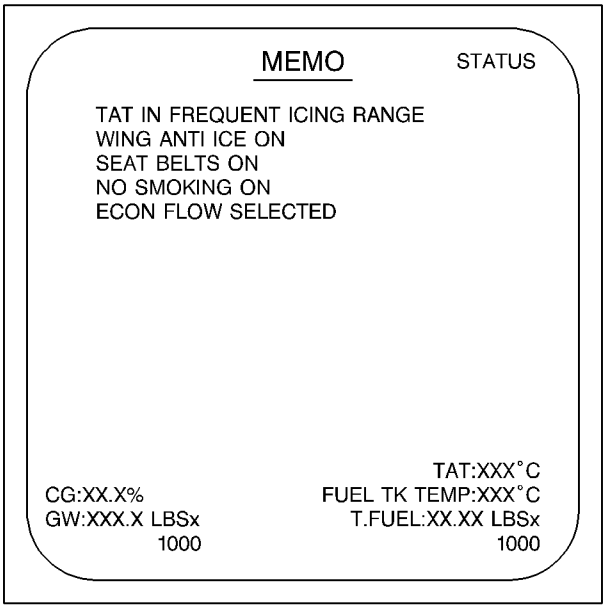
R


LDG INHIB MEMO STATUS
SEAT BELTS ON
NO SMOKING ON
G
G
MEMO title is written in Green in the upper section of the display unit.
LDG INHIB (or T.O INHIB) and STATUS reminder are written in Magenta at same level as MEMO title.
All the MEMO items are written in Green except :
Inscriptions always presented in the lower section of the display unit which are written in Cyan.

BM5 31 51 00 0 DCE0 00

MEMO Messages
Figure 019

R

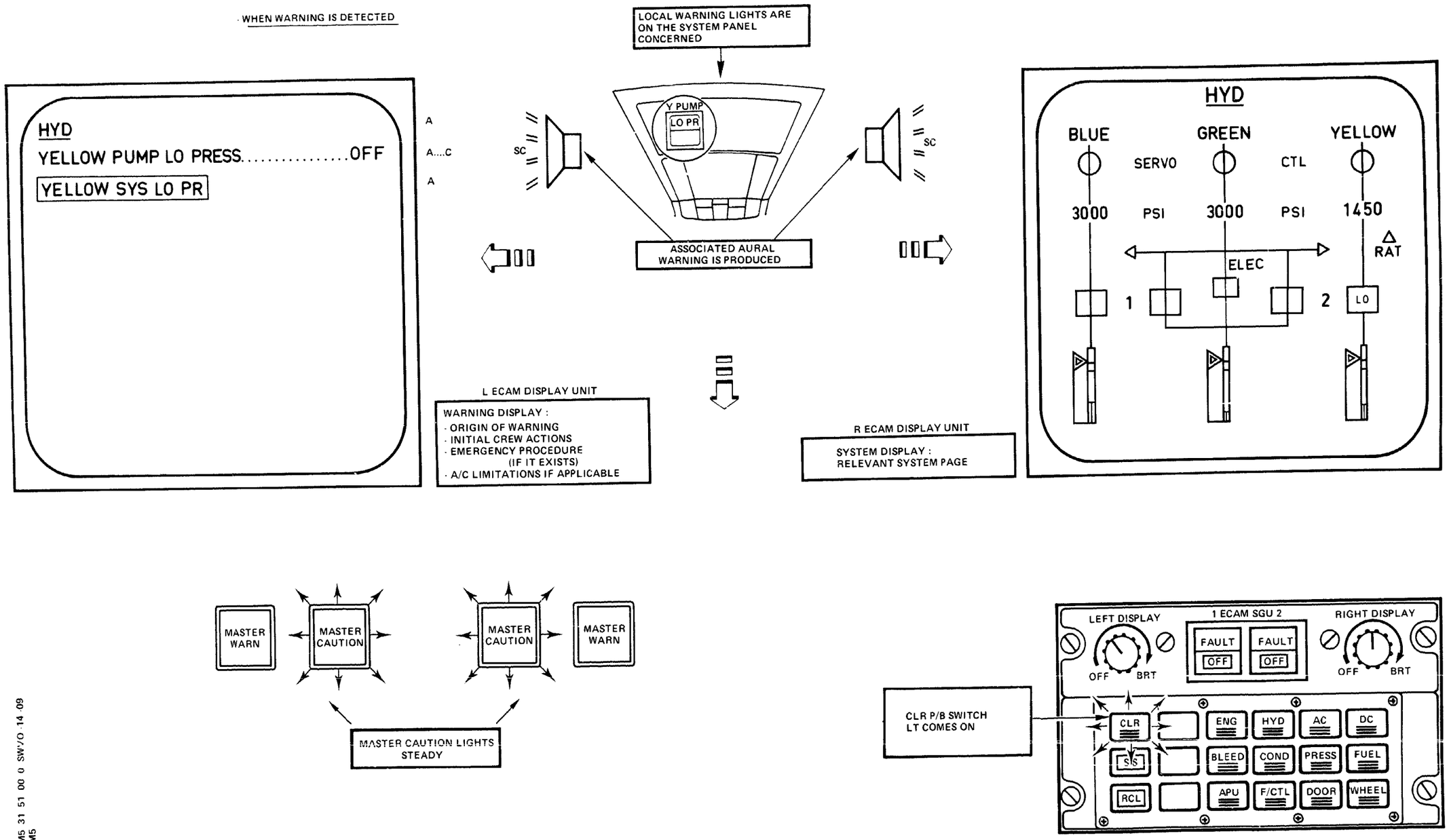


BM5 31 51 00 0 DDJ0 00

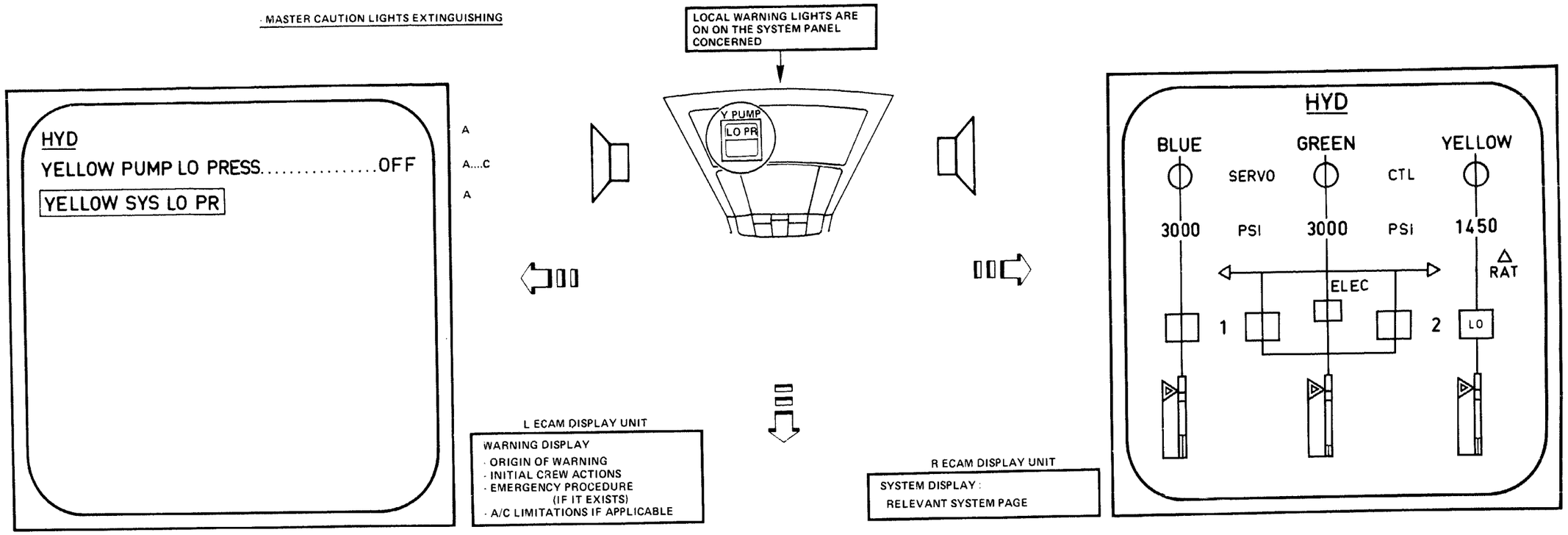
MEMO Messages Page
R Figure 020

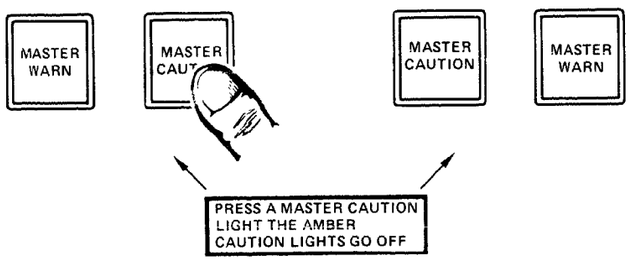
INTENTIONALLY BLANK

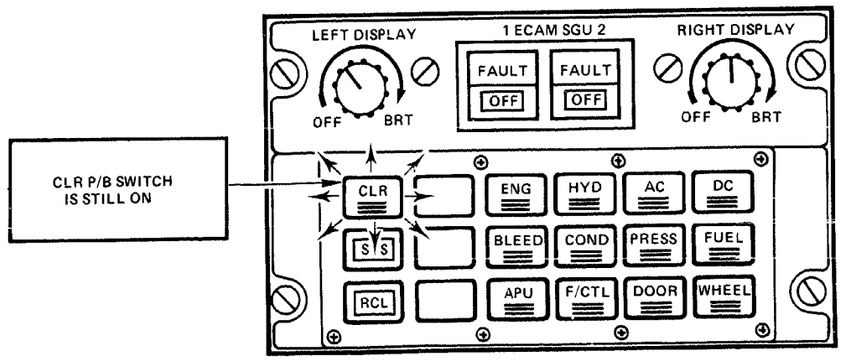
Printed in France



Operation with a Primary Aircraft System Failure
Whem Warning is Detected
Figure 021

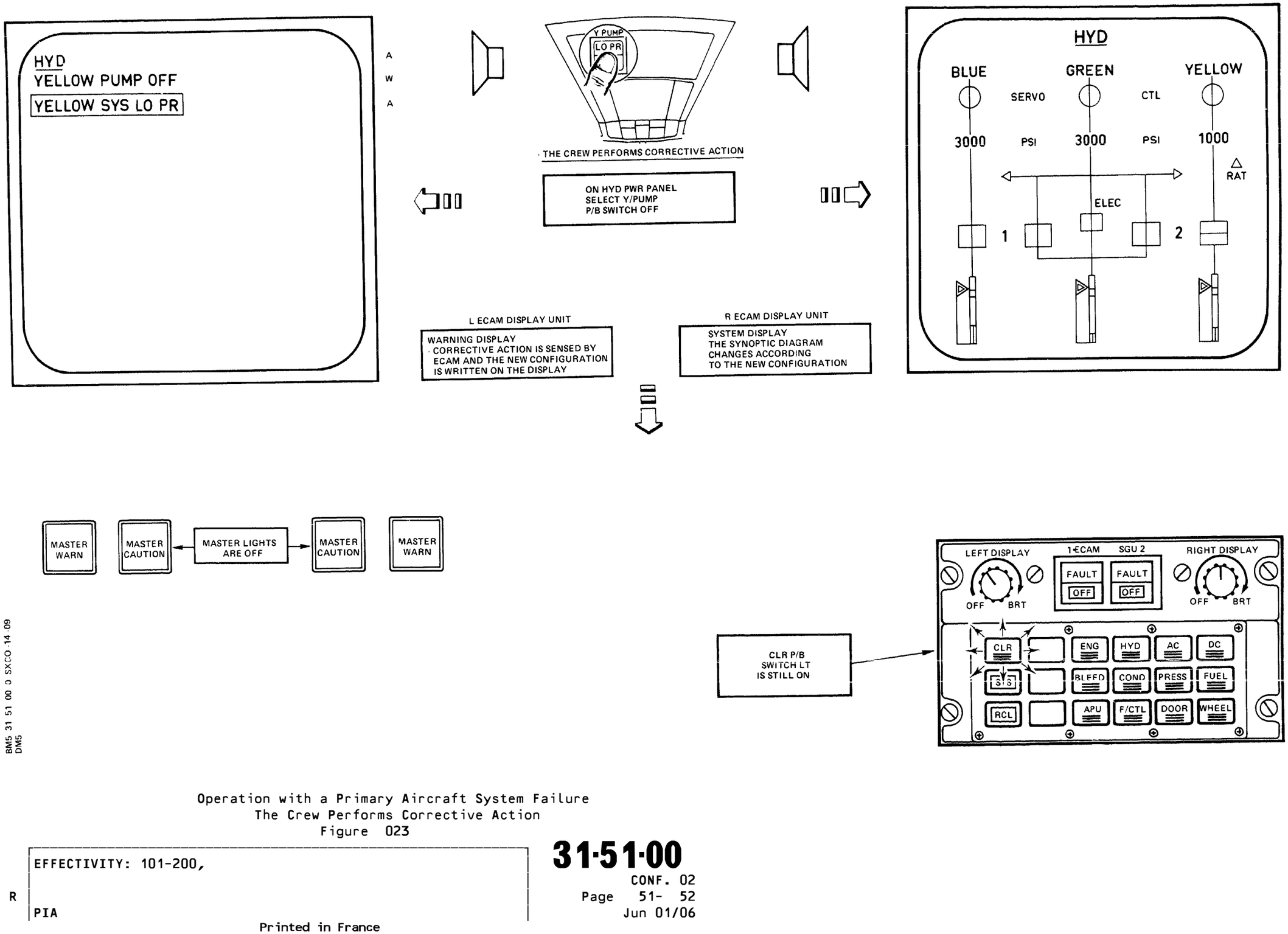






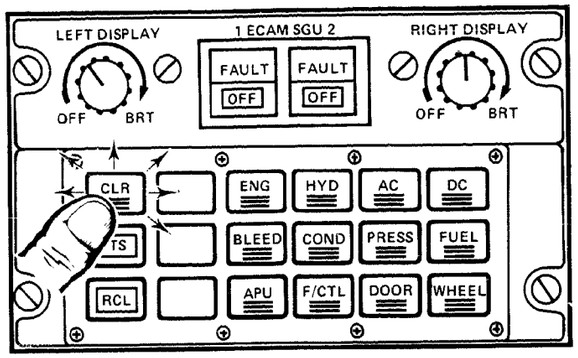
BM5 31 51 00 0 SWZO 14 09
DM5

Operation with a Primary Aircraft System Failure
MASTER CAUTION Lights Extinguishing
Figure 022



BM5 31 51 00 3 SXCO 14 09
DM5

Operation with a Primary Aircraft System Failure
The Crew Performs Corrective Action
Figure 023



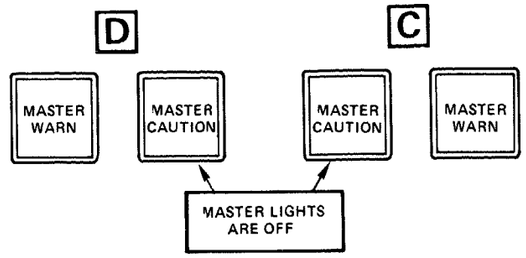
E

PRESS THE CLR P/B SWITCH
CLR LT REMAINS ON

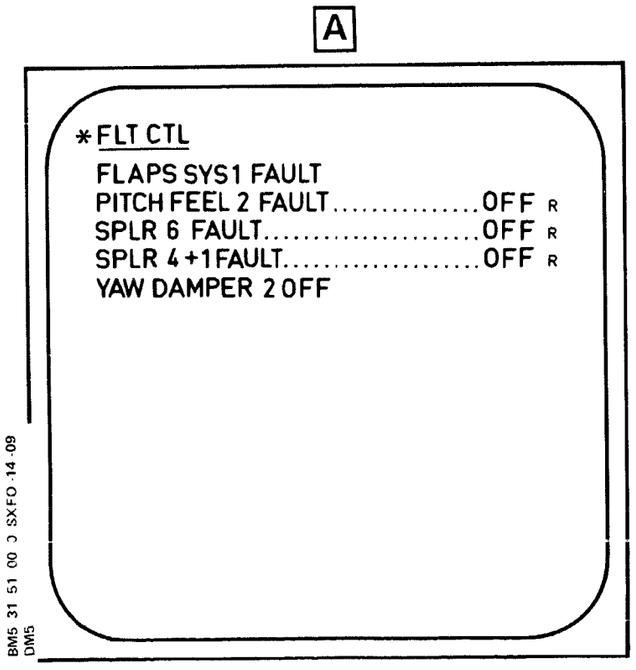
CLEARING
OF THE PRIMARY
FAILURE

D

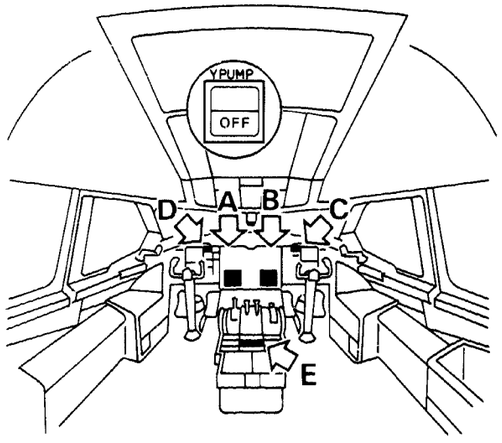
C



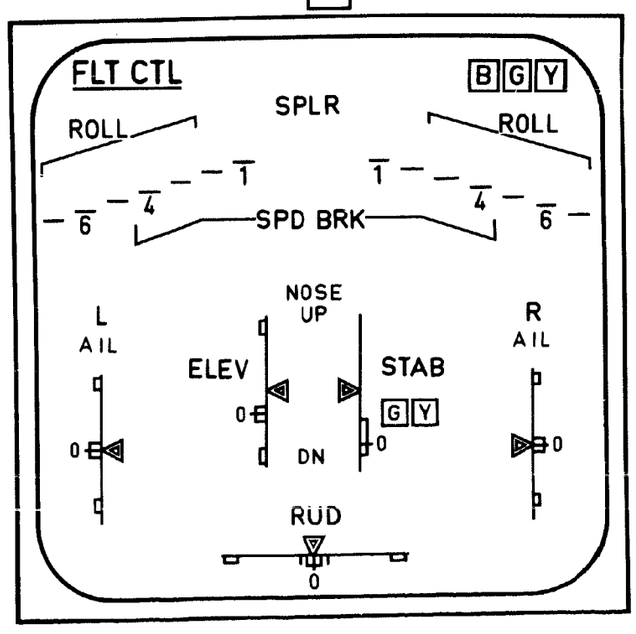
A



A
A
A....C
A....C
A....C
W



B



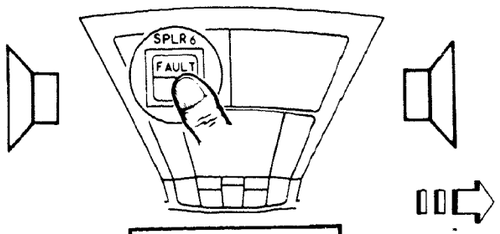
L ECAM DISPLAY UNIT
WARNING DISPLAY
ALL SECONDARY FAILURES ASSOCIATED WITH CORRECTIVE ACTIONS

R ECAM DISPLAY UNIT
SYSTEM DISPLAY
RELEVANT SYSTEM PAGE

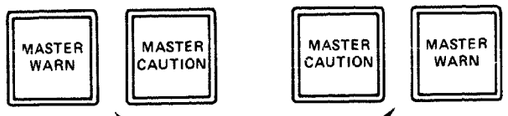
BM5 31 51 00 3 SXFO 14-09
DM5

Operation with a Primary Aircraft System Failure
Clearing of the Primary Failure
Figure 024

- THE CREW PERFORMS CORRECTIVE ACTIONS

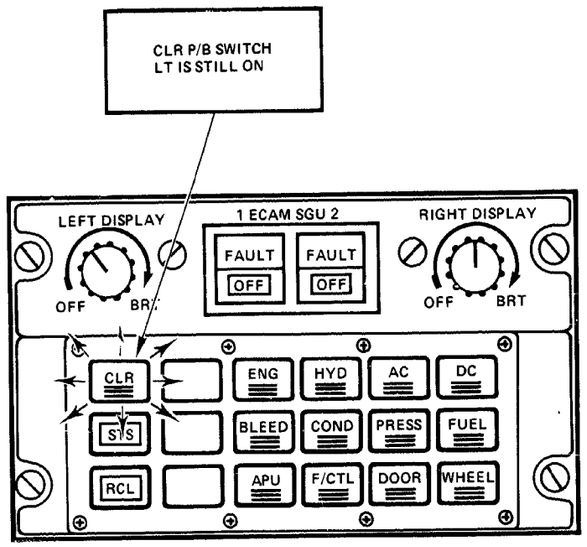


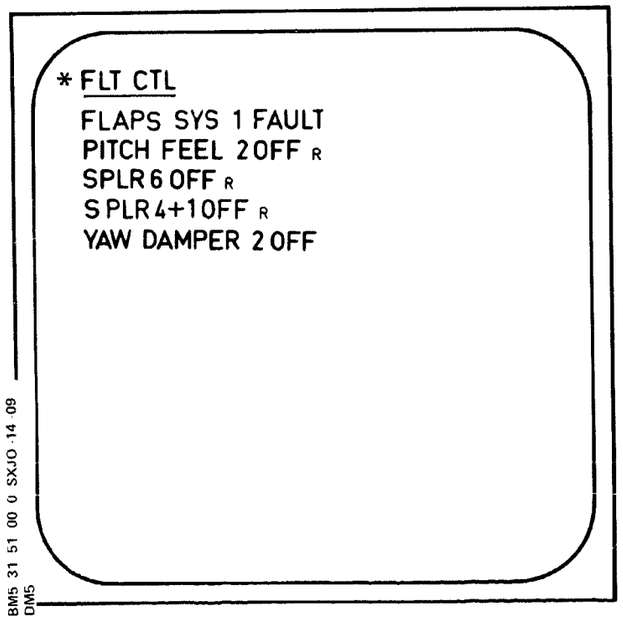
ON THE OVERHEAD PANEL
PRESS THE P/B SWITCHES
WITH FAULT LEGENDS ON



MASTER LIGHTS
ARE OFF

CLR P/B SWITCH
LT IS STILL ON



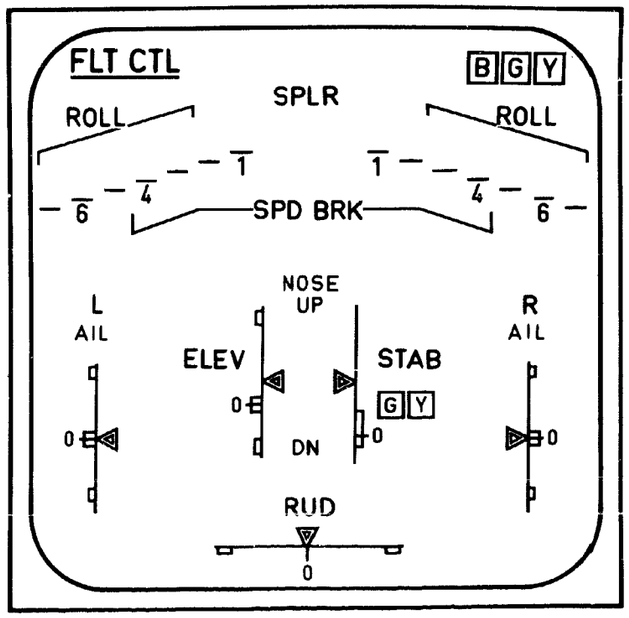


L ECAM DISPLAY UNIT

CORRECTIVE ACTIONS ARE SENSED BY ECAM AND THE NEW CONFIGURATION IS WRITTEN ON THE DISPLAY

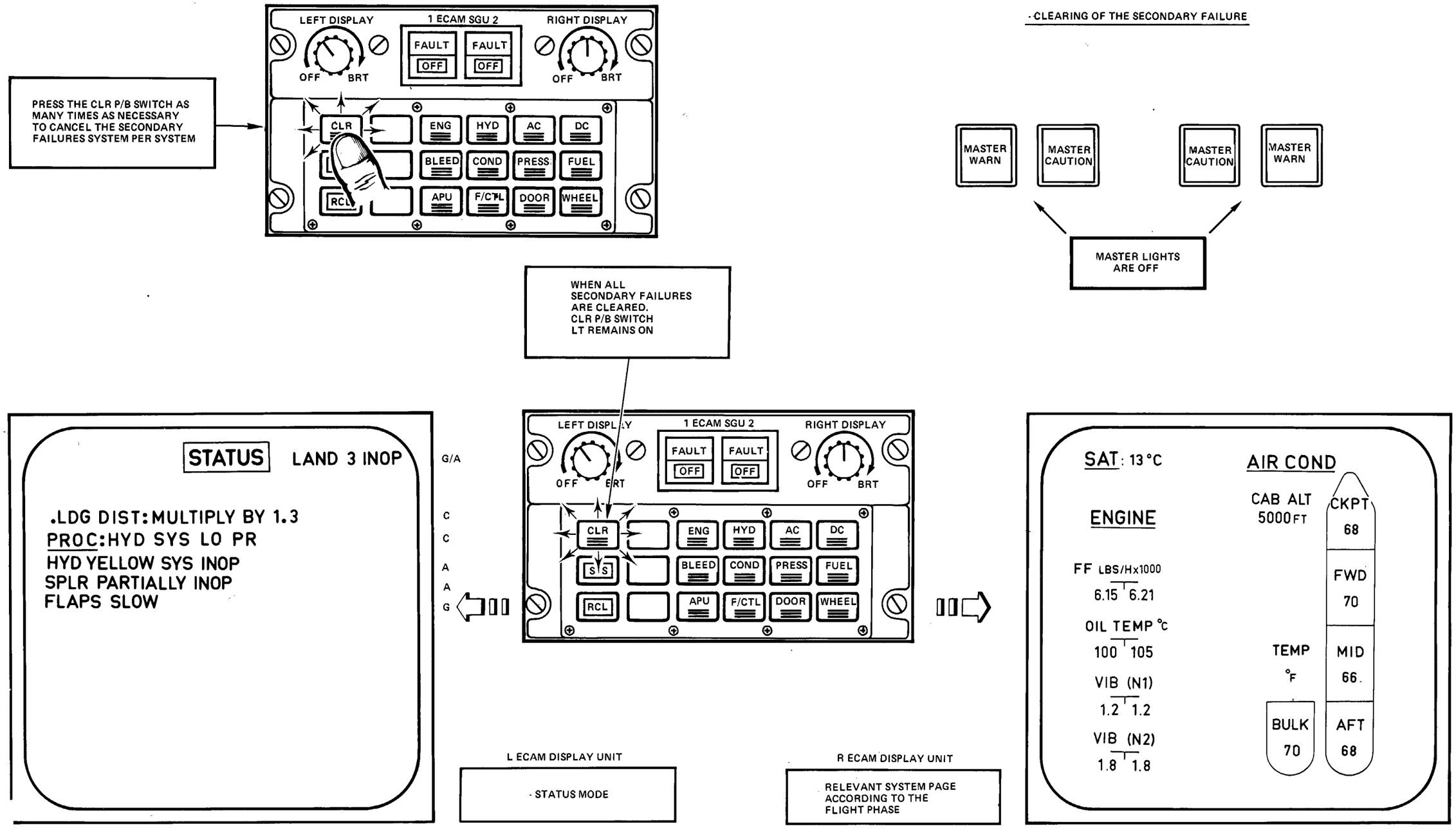
R ECAM DISPLAY UNIT

RELEVANT SYSTEM PAGE



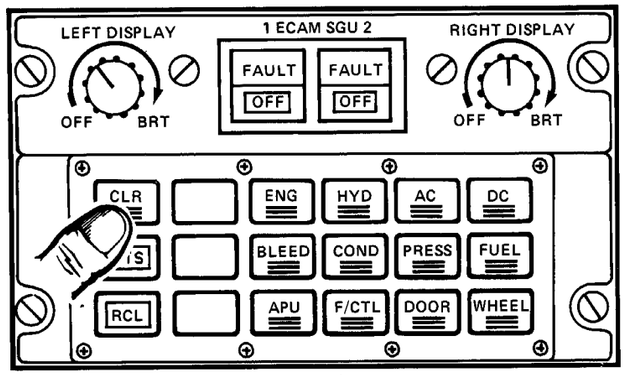
BM5 31 51 00 0 SXJO 14 09
DM5

Operation with a Primary Aircraft System Failure
The Crew Performs Corrective Actions
Figure 025

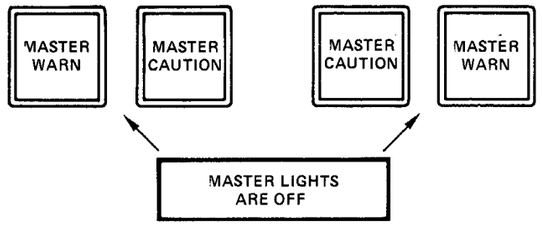


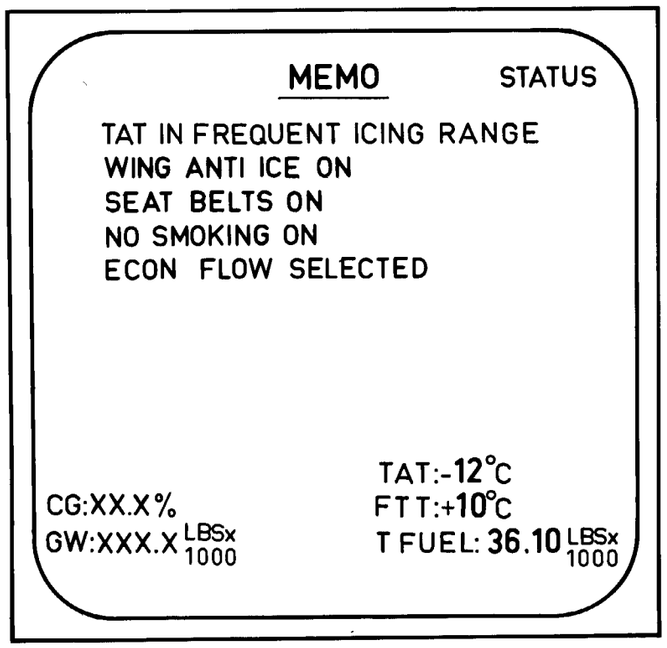
Operation with a Primary Aircraft System Failure
Clearing of the Secondary Failure
Figure 026

- CLEARING OF THE STATUS INFORMATION



PRESS THE CLR P/B SWITCH
ONCE MORE
CLR P/B SW LT
GOES OFF





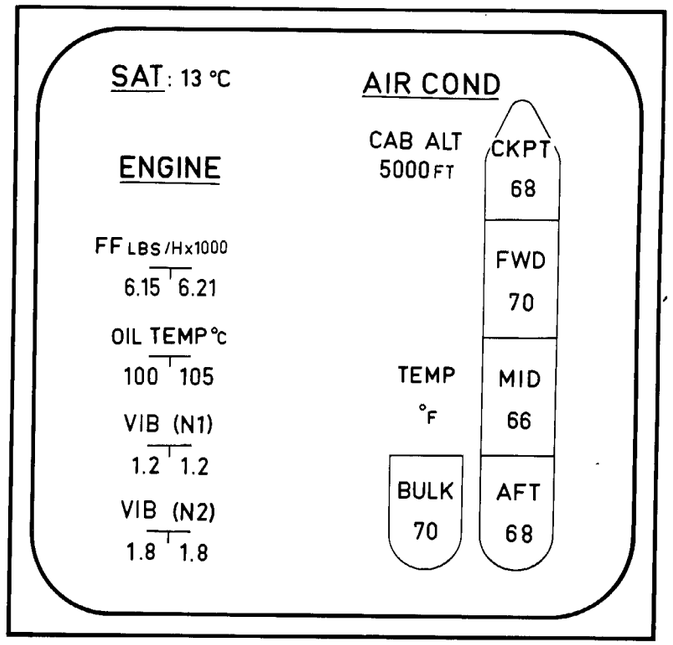
G/M
G
G
G
G
G

L ECAM DISPLAY UNIT

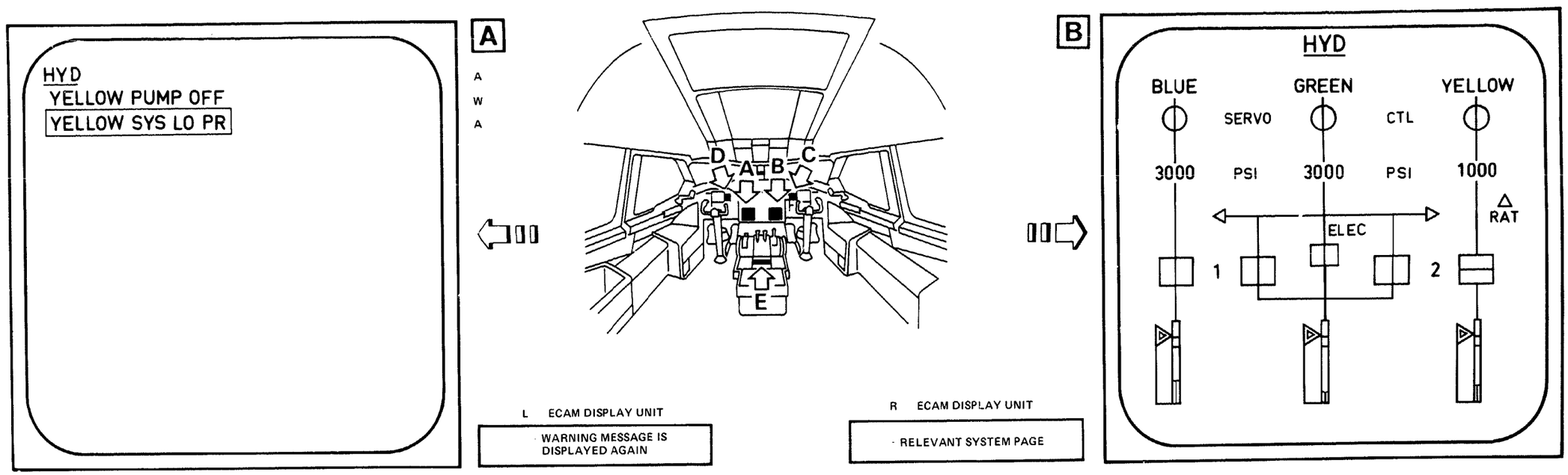
- MEMO MODE

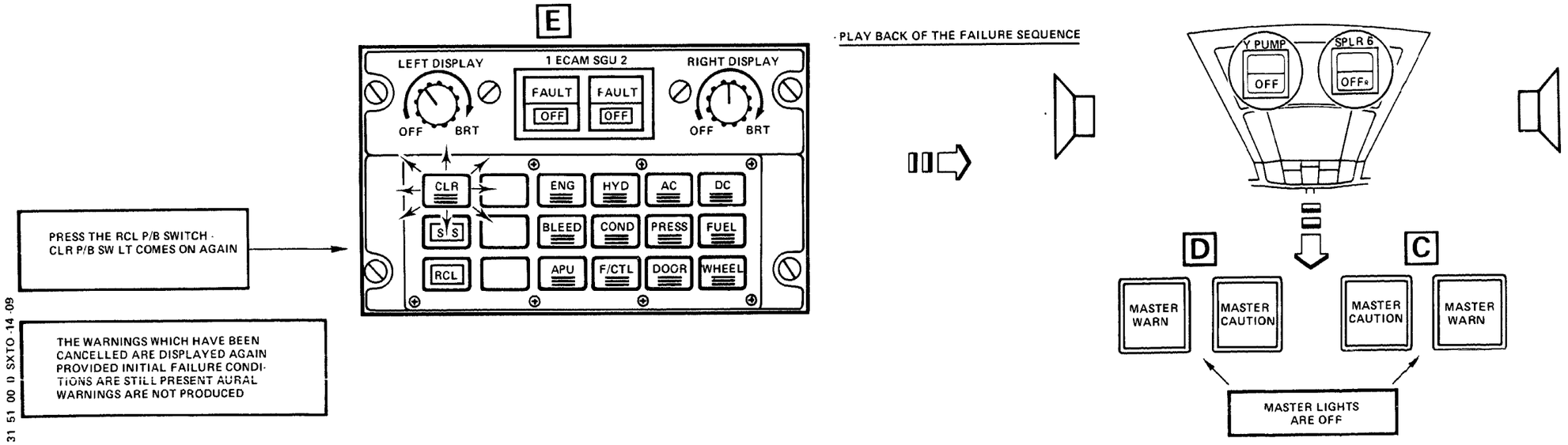
R ECAM DISPLAY UNIT

- RELEVANT SYSTEM PAGE ACCORDING TO THE FLIGHT PHASE



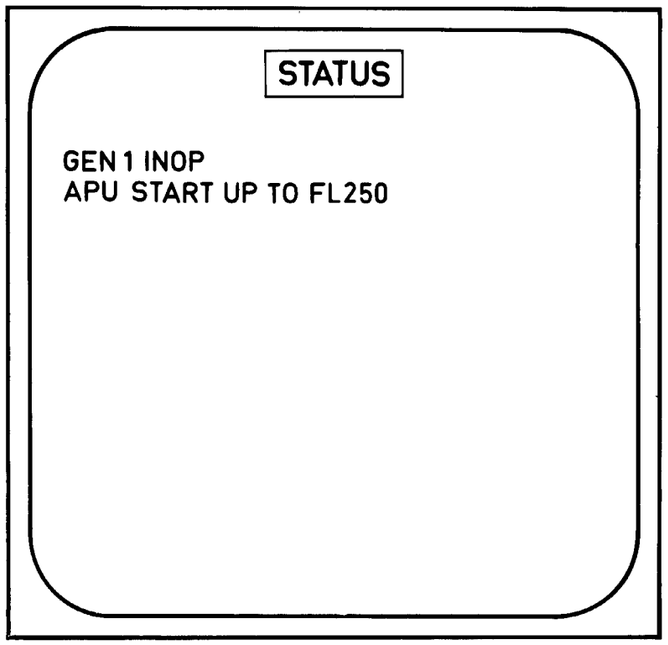
Operation with a Primary Aircraft System Failure
Clearing of the STATUS Information
Figure 027





BM5 31 51 00 0 SXTO 14 09
DM5

Operation with a Primary Aircraft System Failure
Play Back of the Failure Sequence
Figure 028



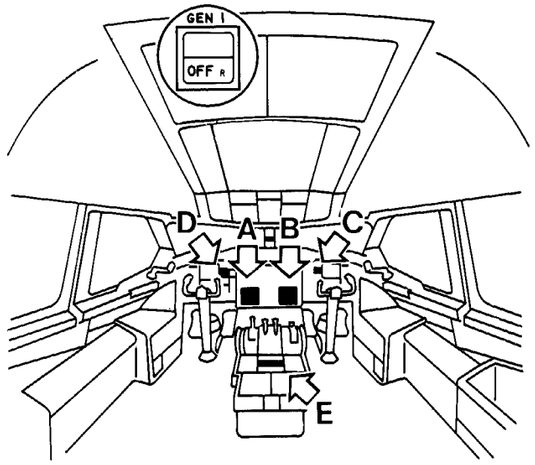
A

G

A

A

G



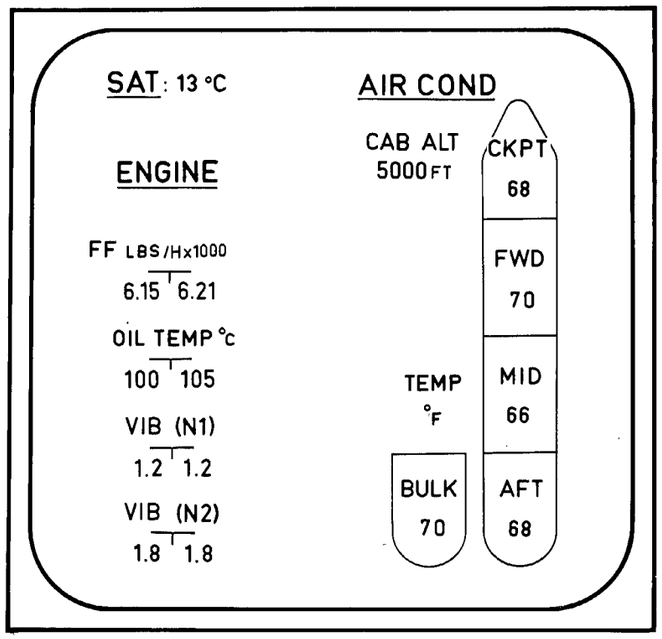
L ECAM DISPLAY UNIT

WARNING DISPLAY
- STATUS PAGE IN FLIGHT PHASES 6, 7, 8 ONLY

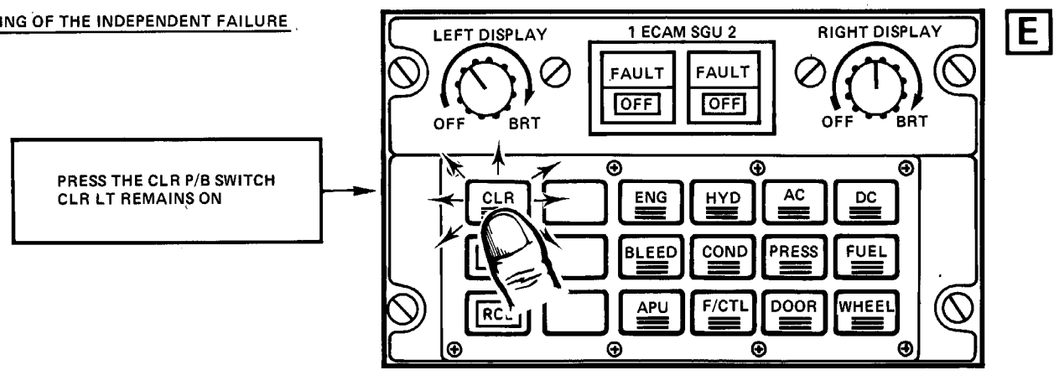
R ECAM DISPLAY UNIT

SYSTEM DISPLAY
PAGE RELATED TO THE FLIGHT PHASE

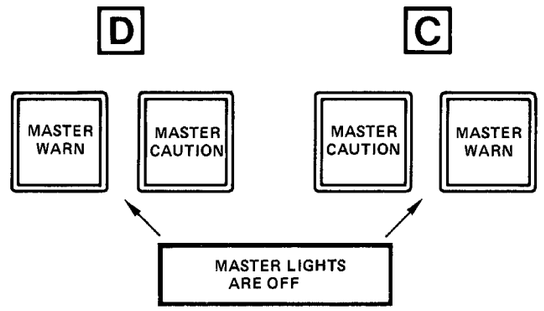
B



- CLEARING OF THE INDEPENDENT FAILURE



E



BM5 31 51 00 0 FWJ0 23

Operation with an Independant Aircraft System Failure
Clearing of the Independant Failure
Figure 029

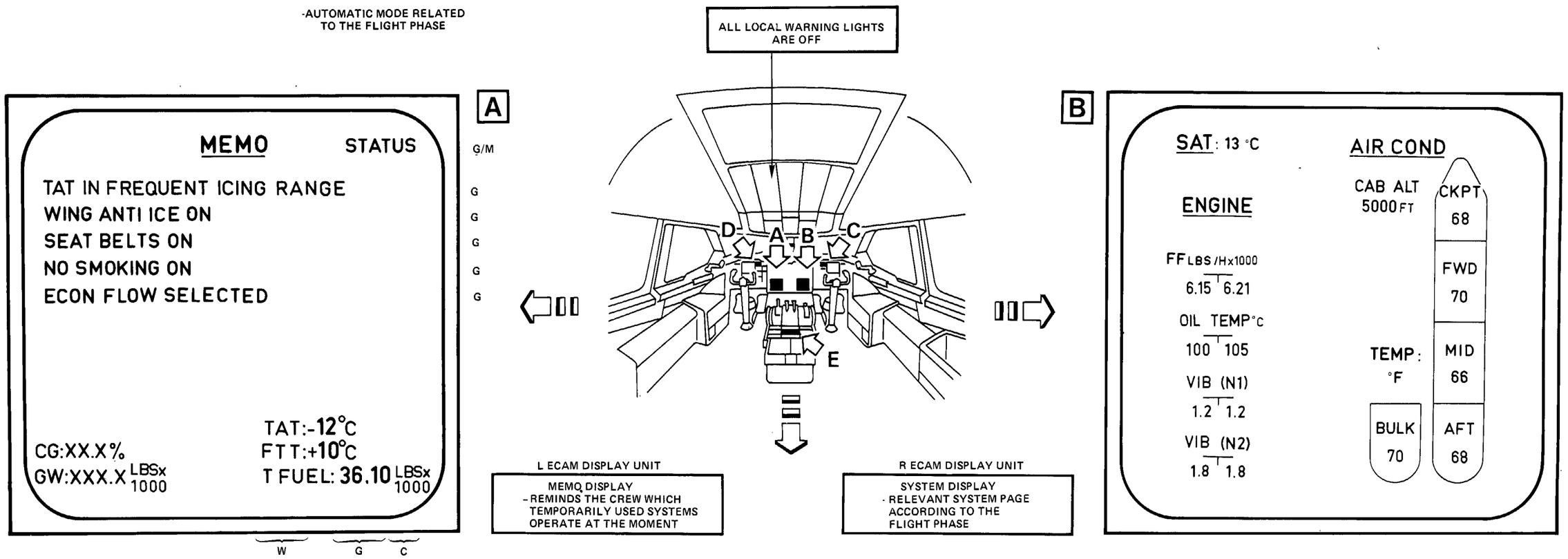
aircraft.
The STATUS message gives the list of all the postponable procedures and all the operationally signifiant modifications of the aircraft status.
This mode is selected
- automatically after a warning message, as soon as all corrective actions have been performed, by pressing the CLR P/B switch and in flight only (Phases 6, 7, 8) (If there is no STATUS, MEMO is directly displayed).
- manually, if no warning is displayed by pressing the STS P/B switch. In this case the CLR P/B SW LT comes on. (If there is no STATUS, NORMAL is directly displayed).

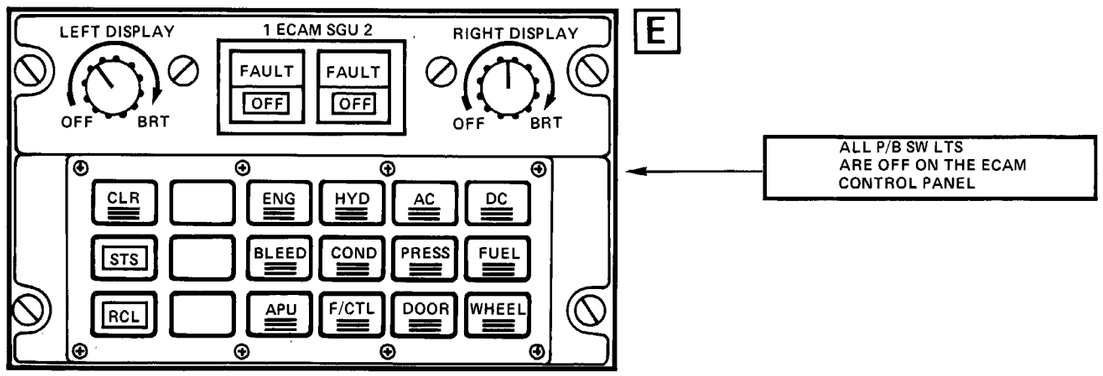
This mode is suppressed automatically when a warning message occurs or manually when the CLR P/B switch is pressed.

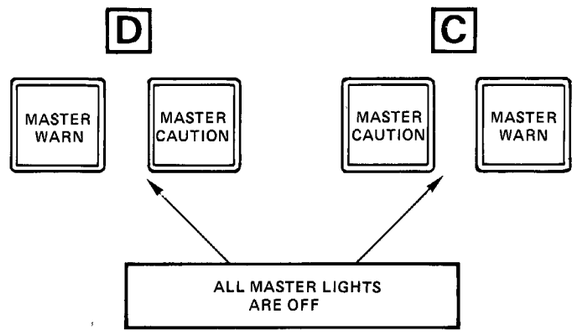
(c)MEMO mode
(Ref. Fig. 030)
(Ref. Fig. 031)
(Ref. Fig. 032)
(Ref. Fig. 033)
This mode gives the basic page of the L ECAM display unit. It reminds the crew of temporarily used systems or of operating functions.
- This mode is selected automatically when no other mode is engaged
- It can be suppressed manually when the STS or RCL P/B switch is pressed or automatically as soon as another mode is engaged.

INTENTIONALLY BLANK

Printed in France

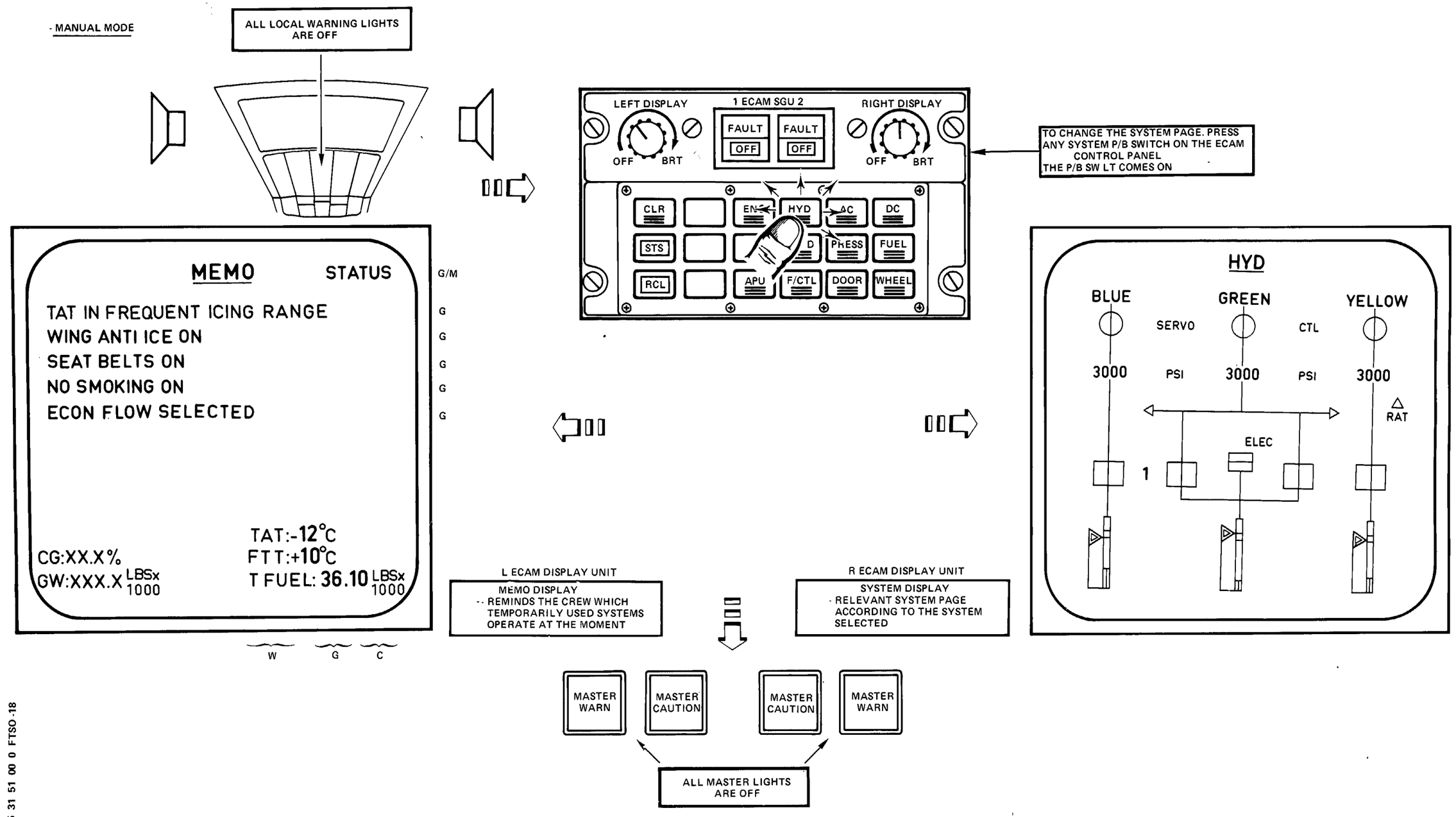






BM5 31 51 00 0 FTPO-18

Operation without Aircraft System Failure
Automatic Mode Related to the Flight Phase
Figure 030

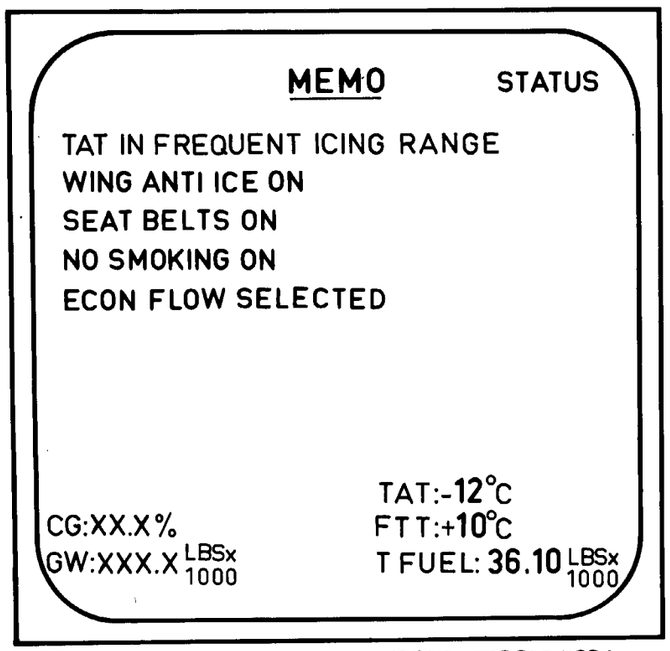


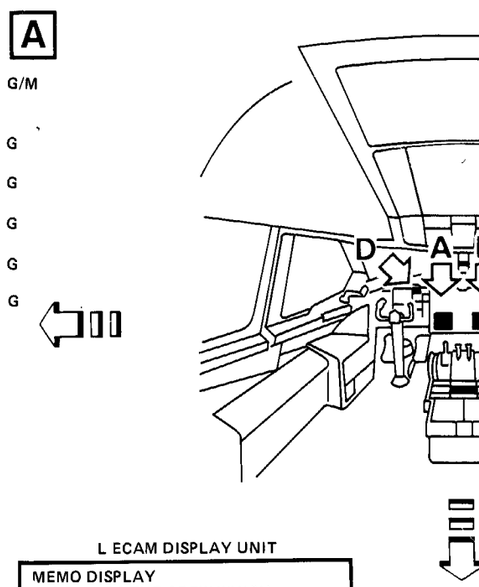
BM5 31 51 00 0 FTSO-18

Operation without Aircraft System Failure
Manual Mode
Figure 031

- AUTOMATIC ADVISORY MODE

ALL LOCAL WARNING LIGHTS ARE OFF



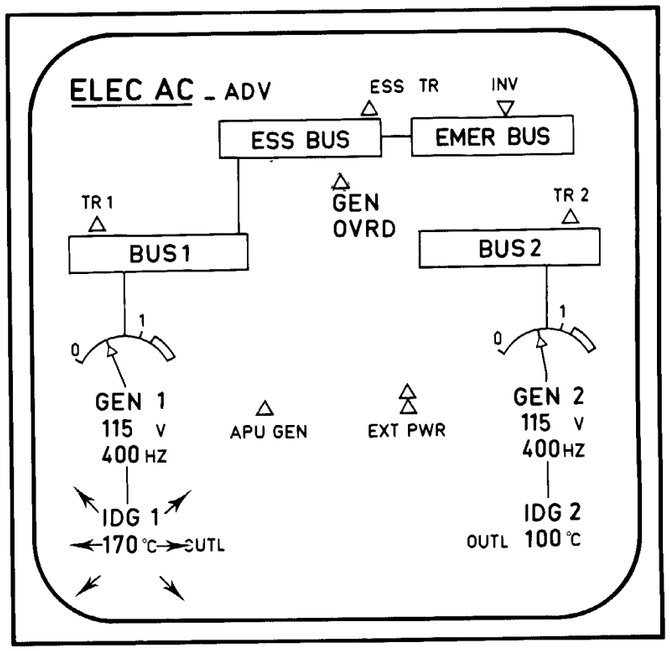


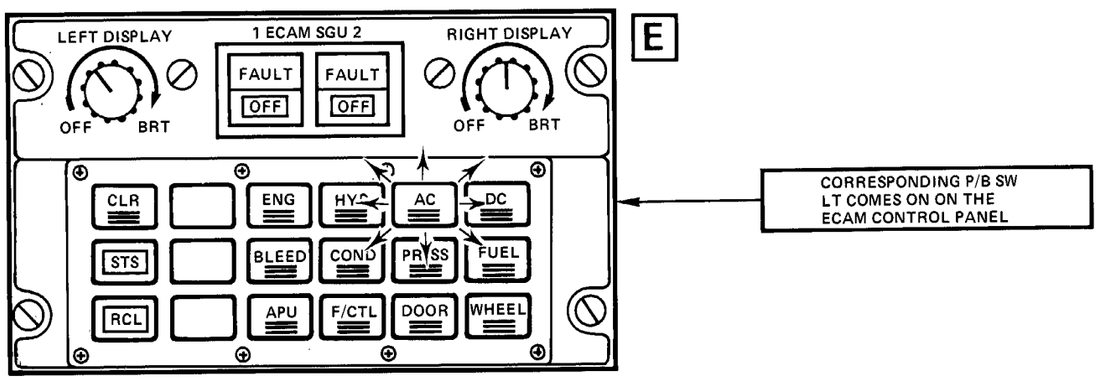
L ECAM DISPLAY UNIT

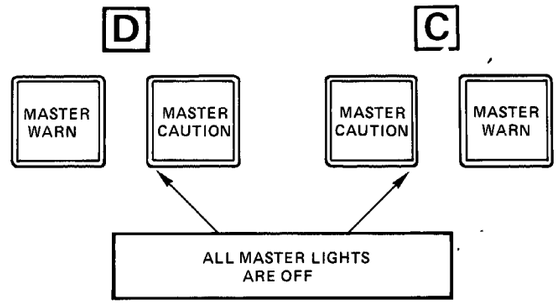
MEMO DISPLAY
- REMINDS THE CREW WHICH TEMPORARILY USED SYSTEMS OPERATE AT THE MOMENT

R ECAM DISPLAY UNIT

SYSTEM DISPLAY
- RELEVANT SYSTEM PAGE ACCORDING TO THE PARAMETER DRIFT



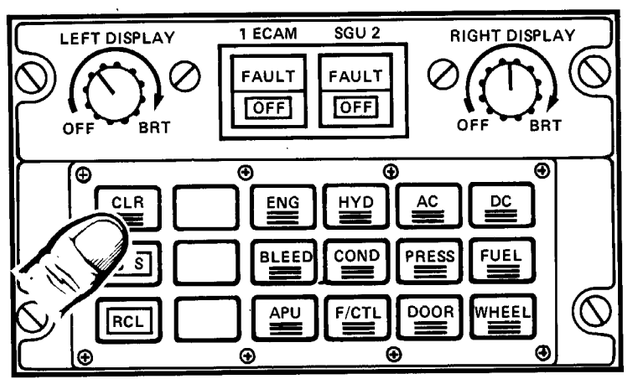




BM5 31 51 00 0 FTW0 - 18

Operation without Aircraft System Failure
Automatic Advisory Mode
Figure 032

CLEARING OF THE STATUS INFORMATION



E

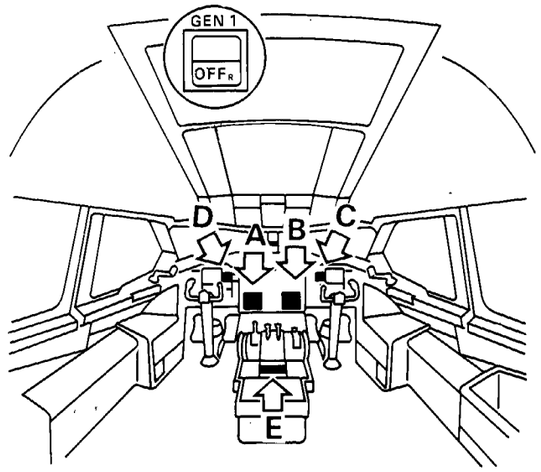
PRESS THE CLR P/B SWITCH
CLR LT GOES OFF

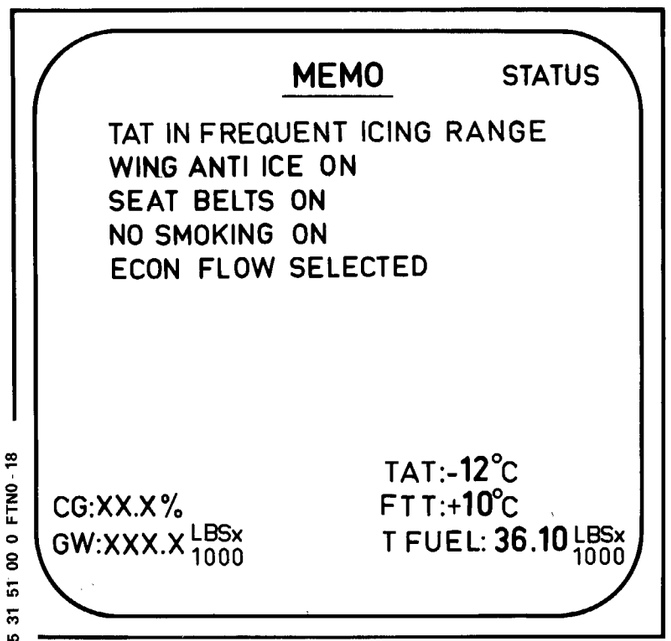
D C

MASTER WARN | MASTER CAUTION | MASTER CAUTION | MASTER WARN

ALL MASTER LIGHTS ARE OFF

A B





G/M
G
G
G

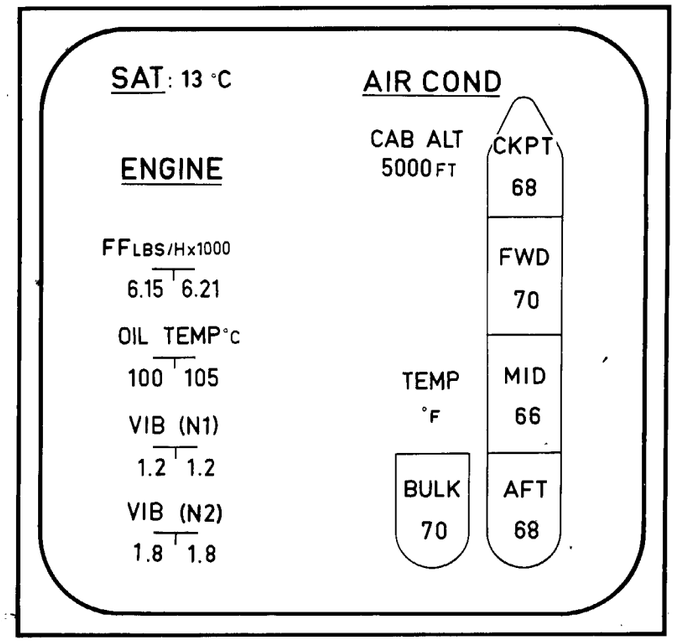
W G C

L ECAM DISPLAY UNIT

WARNING DISPLAY
- MEMO PAGE

R ECAM DISPLAY UNIT

SYSTEM DISPLAY
- PAGE RELATED TO THE FLIGHT PHASE



BM5 31 51 00 0 FTN0 - 18

Operation with an Independent Aircraft System Failure
Clearing of the STATUS Information
Figure 033

L. R ECAM Display Unit

(1)Normal display

In normal operation (without display unit failure), the R ECAM display unit presents one of the system synoptic diagrams.

(2)System presentation

(a)Synoptic diagrams

(Ref. Fig. 034)

R

(b)Alphanumeric and analog indications

The alphanumeric values or analog indications are green when no warning threshold has been reached.

The warning ranges are shown in the color related to the warning level (amber or red).

Unavailable values are replaced by a double X in amber.

When a warning threshold is reached, the pointer and the numerical value become amber (or red).

All the units are shown in cyan.

The system titles are shown in white if the system page is called manually or by an advisory situation (in this last case the title is followed by the mention ADV written in white (flashing) until the associated system P/B switch on the control panel is pressed).

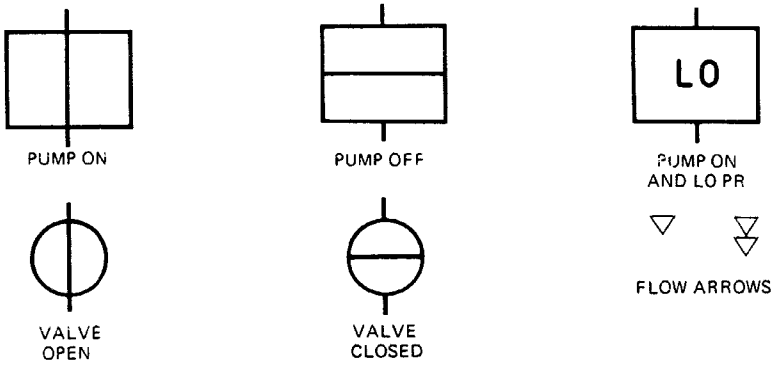
In all the other cases the system titles are green.

(c)System pages

The complete list of system pages is :

R 1 AIR COND
R (Ref. Fig. 035)
R 2 CAB PRESS
R (Ref. Fig. 036)
R (Ref. Fig. 037)
R 3 AIR BLEED
R (Ref. Fig. 038)
R (Ref. Fig. 039)
R (Ref. Fig. 040)
R 4 ELEC AC (Ref. Fig. 041, 042, 043)
R 5 ELEC DC (Ref. Fig. 044)
R 6 FLT CTL
R (Ref. Fig. 045)
R 7 FUEL (Ref. Fig. 046, 047)
R (Ref. Fig. 048)
R 8 HYD
R (Ref. Fig. 049, 050)
R 9 WHEEL
R (Ref. Fig. 051)
R 10 APU
R (Ref. Fig. 052)
R (Ref. Fig. 053)
R 11 DOOR
R (Ref. Fig. 054)
R 12 ENGINE
R (Ref. Fig. 055)
R 13 CRUISE

SYMBOLOGY

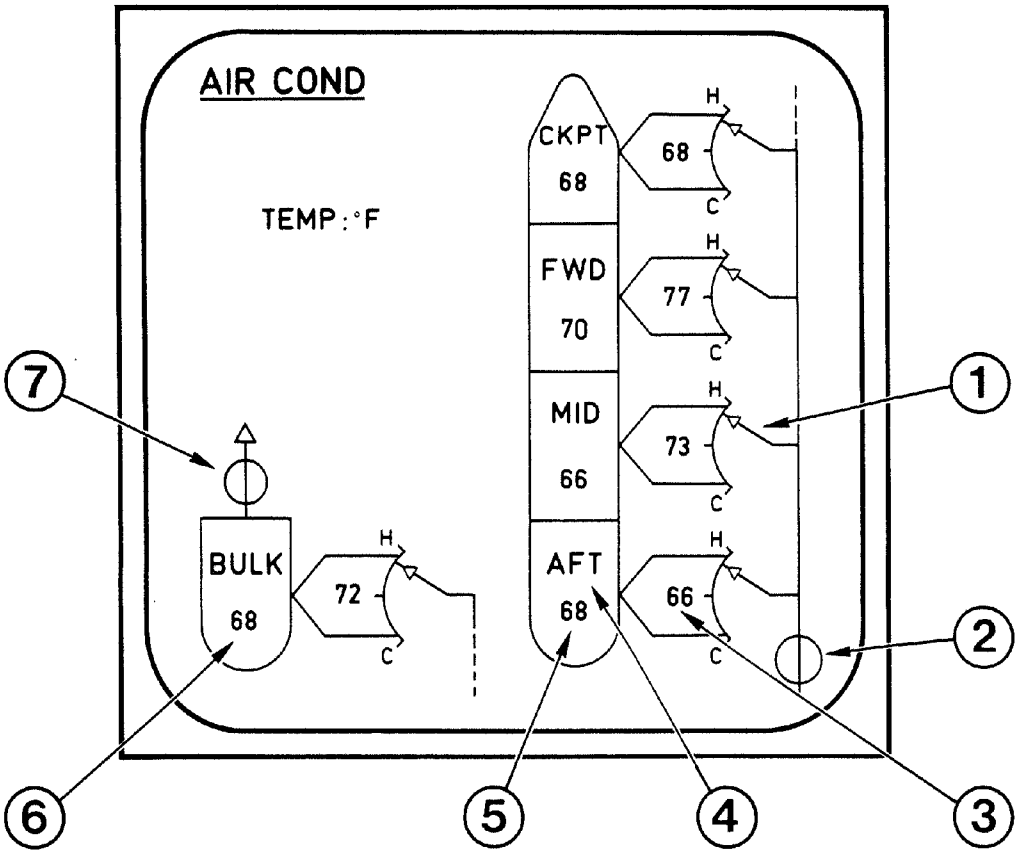


· COLOR CODING THE PART OF THE SYNOPTIC DIAGRAM IS :	COLOR
OK NOT USABLE NOT IN USE OFF WRITTEN NORMAL OFF NOT WRITTEN ABNORMAL OFF NOT WRITTEN	GREEN AMBER NOT SHOWN WHITE GREEN AMBER

PUMPS ON OR VALVES OPEN ARE SHOWN IN GREEN OR AMBER ACCORDING TO THE SYNOPTIC DIAGRAM COLORS. IF DATA IS NOT AVAILABLE THE SYNOPTIC DIAGRAM IS NOT SHOWN AND REPLACED BY THE MENTION NO DATA AVAILABLE WRITTEN IN AMBER

BM5 31 51 00 0 RDPO - 10
DM5

Synoptic Diagrams - Symbology
Figure 034



1 - TRIM AIR VALVE POSITION INDICATION (G)

H HOT VALVE 100 % OPEN
C - COLD - VALVE FULLY CLOSED
(A) WHEN HOT AIR SUPPLY VALVE CLOSED

2 - HOT AIR SUPPLY VALVE

(G) : VALVE OPEN

(A) : VALVE CLOSED

3 - DUCT TEMPERATURE (G)
(A) WHEN DUCT t° ≥ 190° F

4 - COMPARTMENT IDENTIFIER (W)
(A) WHEN DUCT t° ≥ 190° F

5 - COMPARTMENT TEMPERATURE (G)

6 - CARGO COMPARTMENT TEMPERATURE (G)
FLASHES WHEN t° > 92° F

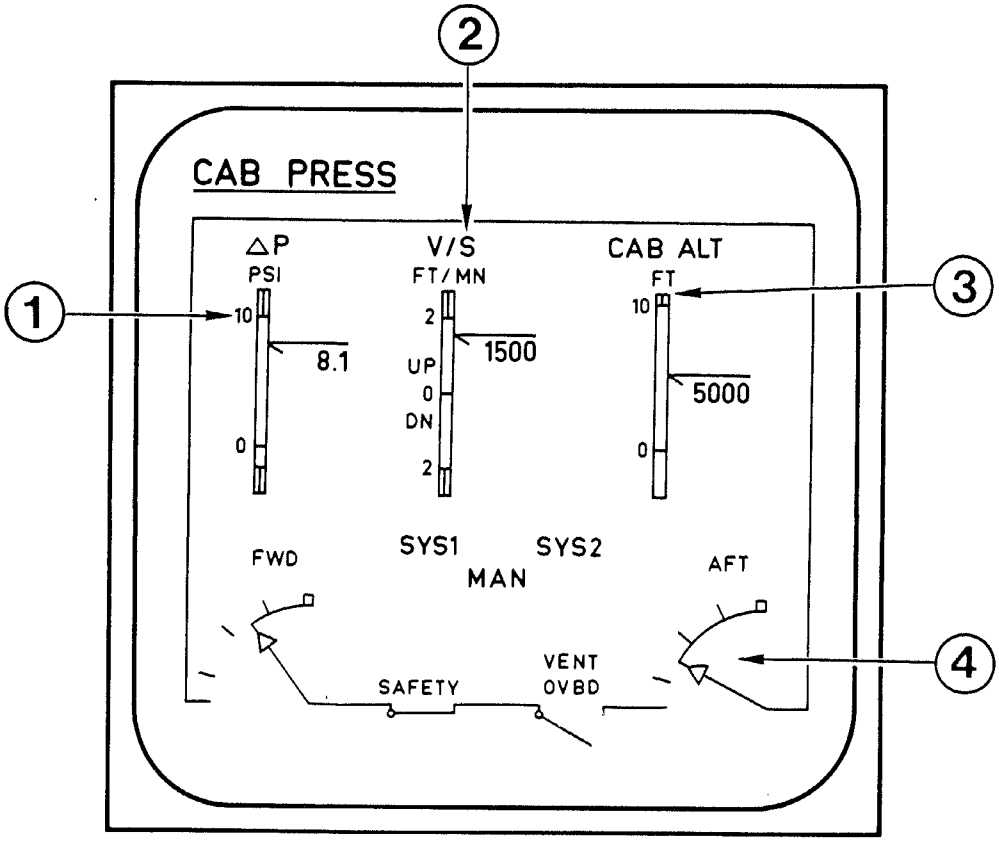
7 - CARGO ISOLATION VALVE

(G) : VALVE OPEN

(A) : VALVE CLOSED

BM5 31 51 00 0 FDV1 00

AIR COND System Display
Figure 035



1 - CABIN DIFFERENTIAL PRESSURE (G)
FLASHES WHEN ΔP ≥ 8.6 PSI
(A) WHEN Δ P ≤ −1 PSI
≥ 10 PSI

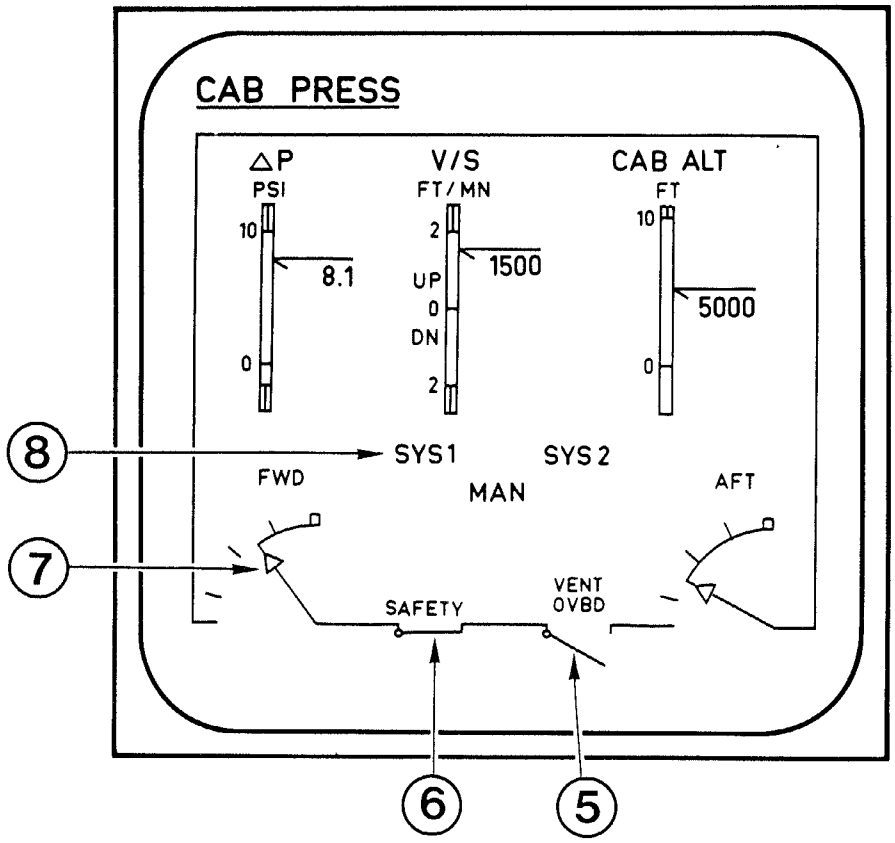
2 - CABIN VERTICAL SPEED (G)
FLASHES WHEN V/S ≥ V/S SELECTED + 50 %
(A) WHEN V/S ≤ − 2000 Ft/mn
≥ 2000 Ft/mn

3 - CABIN ALTITUDE (G)
(R) WHEN CABIN ALTITUDE ≥ 10000 Ft

4 - REGULATING VALVE (G)
FLASHES WHEN AFT REGUL VALVE POSITION DIFFERS FROM THE FWD REGUL VALVE POSITION MORE THAN 40%.
(A) WHEN OPEN ≥ 95% IN FLIGHT ONLY

BM5 31 51 00 0 AED0 -09 -04
DM5

CAB PRESS System Display (1/2)
Figure 036



5 - EXTRACT VALVE
VENT OVBD (W)
(G) VALVE FULLY CLOSED
VENT OVBD (W)
(G) VALVE PARTIALLY OPEN
VENT OVBD (A)
(A) VALVE FULLY OPEN ONLY IN FLIGHT (STAYS (G) ON GROUND)

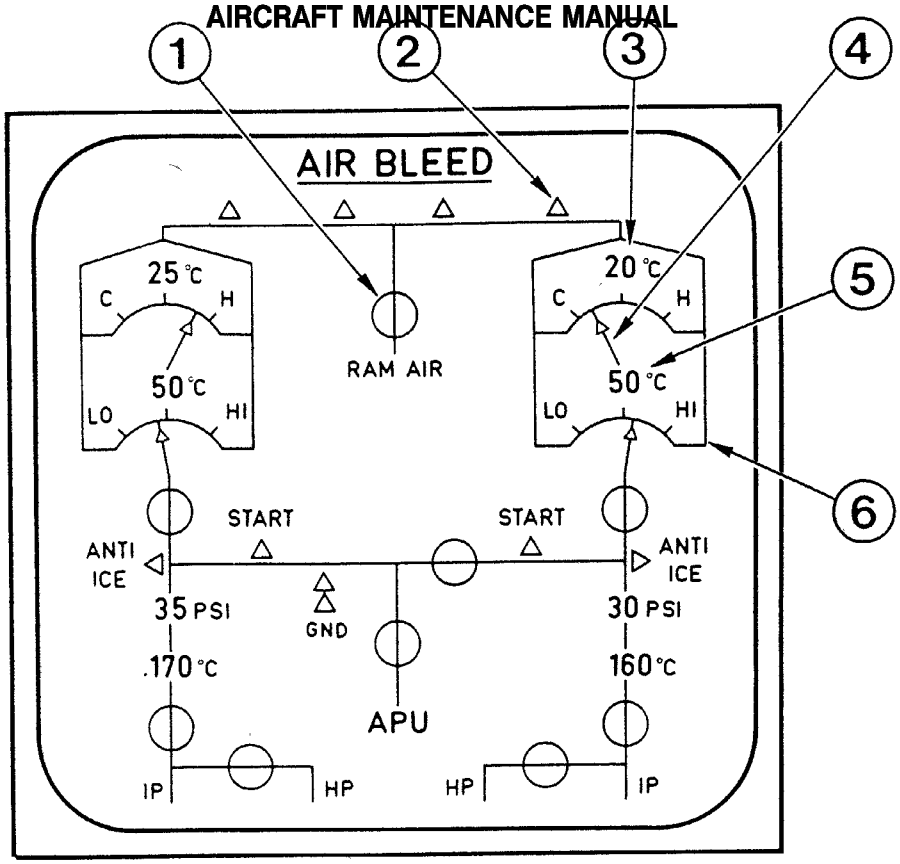
6 - FWD AFT SAFETY VALVES
SAFETY (W)
(G) VALVE FULLY CLOSED
SAFETY (A)
(A) VALVE OPEN

7 - REGULATING VALVE (G)
FLASHES WHEN AFT REGULATING VALVE POSITION DIFFERS FROM THE FWD REGULATING VALVE POSITION MORE THAN 40%
(A) WHEN OPEN ≥ 95% IN FLIGHT ONLY

8 - ACTIVE SYSTEM INDICATION
SYS 1 (G) WHEN ON
SYS 1 (A) WHEN FAULT OR SW OFF
NOT DISPLAYED WHEN NOT ACTIVE
SYS 2 (G) WHEN ON
SYS 2 (A) WHEN FAULT OR SW OFF
NOT DISPLAYED WHEN NOT ACTIVE
MAN (W) WHEN SYS 1 AND SYS 2 FAULT OR SW OFF

BM5 31 51 00 0 AEE0 -09 -04
DM5

CAB PRESS System Display (2/2)
Figure 037



1 - RAM AIR INLET VALVE

(G) : VALVE OPEN

(G) : VALVE CLOSED

2 - COLD AIR DUCT SUPPLY (G)

(A) WHEN NO COLD AIR IS SUPPLIED

3 - PACK DISCHARGE TEMPERATURE (G)

(A) WHEN $t^{o} \leq -18^{o}C$

4 - PACK TEMPERATURE CONTROL VALVE (G)

C - COLD, VALVE CLOSED
H - HOT, VALVE FULLY OPEN

5 - TURBINE INLET TEMPERATURE (G)

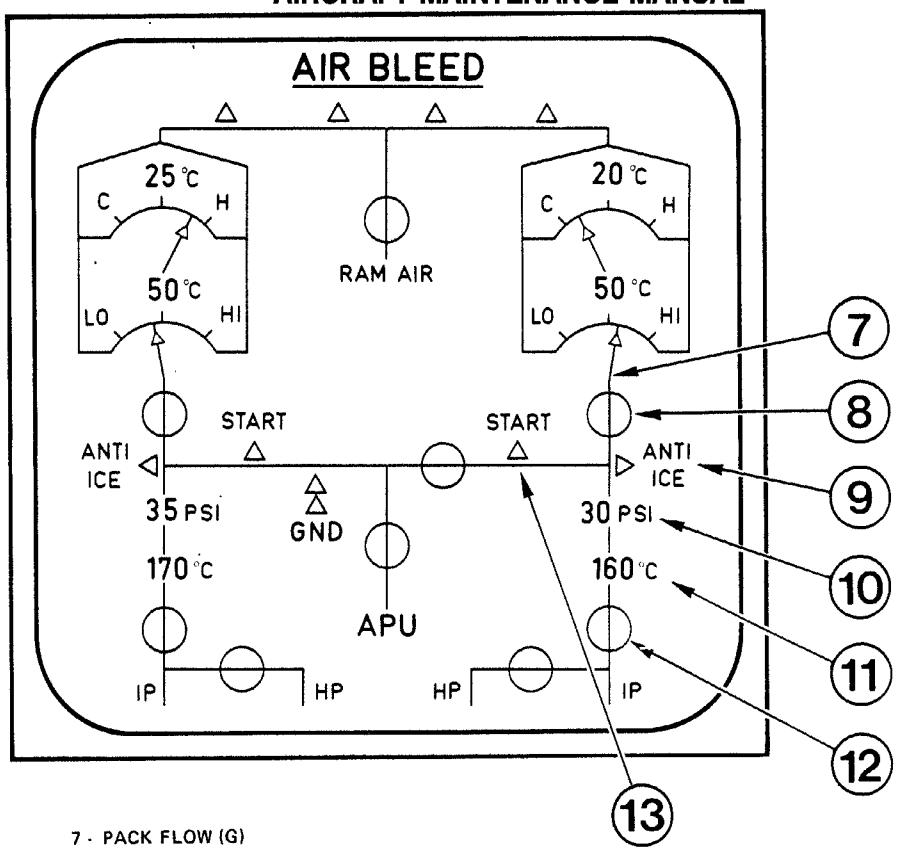
FLASHES WHEN $t^{o} \geq 95^{o}$ C AND $< 120^{o}$C
(A) WHEN $t^{o} \geq 120^{o}$ C

6 - PACK SYMBOL (W)

(A) WHEN PACK INOPERATIVE, PACK VALVE CLOSED AND ENG START NOT SELECTED

BM5 31 51 00 0 AEH0 -09 -04
DM5

AIR BLEED System Display (1/3)
Figure 038



7 - PACK FLOW (G)
(A) WHEN ΔP ≤ 0.50 PSI

8 - PACK VALVE
⊕ (G) : VALVE OPEN
⊖ (A) : VALVE CLOSED

9 - WING ANTI-ICE (NOT DISPLAYED)
▷ ANTI ICE (G) (W) WHEN WING SUPPLY P/B SWITCH IS SELECTED ON

10 - PRECOOLER INLET PRESSURE (G)
(A) WHEN P ≤ 8 PSI
≥ 57 PSI
XX(A) IF POWER SUPPLY LOSS FOR CONTROLLER INDICATOR

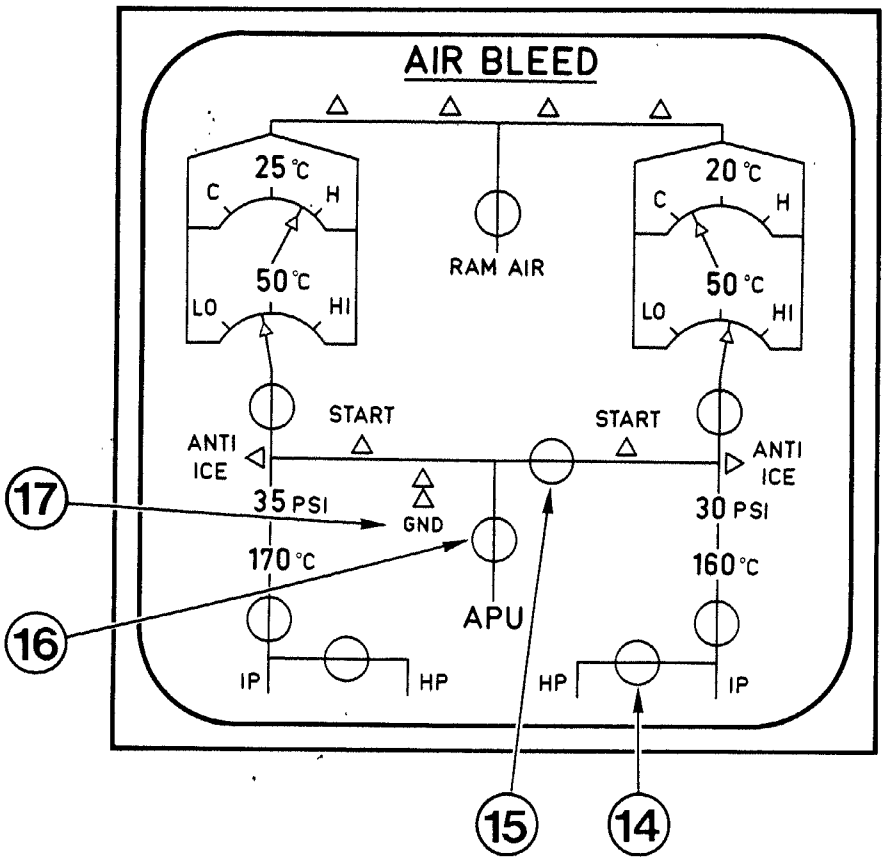
11 - PRECOOLER OUTLET TEMPERATURE (G)
(A) WHEN t° ≥ 207°C/255°C
HIGHER VALUE VALID WHEN WING ANTI ICE ON

12 - BLEED VALVE
⊕ (G) : VALVE OPEN
⊖ (A) : VALVE CLOSED

13 - ENGINE START (NOT DISPLAYED)
START (W) △ (G) WHEN ENG START SELECTOR IS IN START A OR B OR CRANK POSITION

BM5 31 51 00 0 AEJ1 25 20
DM5

AIR BLEED System Display (2/3)
Figure 039



14 - HP VALVE

- AUTOMATIC MODE

(G) : VALVE OPEN

(G) : VALVE CLOSED

- OFF MODE (HP VALVE P/B SWITCH IS SELECTED OFF)

(A) : VALVE OPEN
(A) : VALVE CLOSED
} ACCORDING TO THE VALVE POSITION

15 - X-FEED VALVE

(G) : VALVE OPEN

(G) : VALVE CLOSED

16 - APU BLEED VALVE

(G) : VALVE OPEN

(G) : VALVE CLOSED

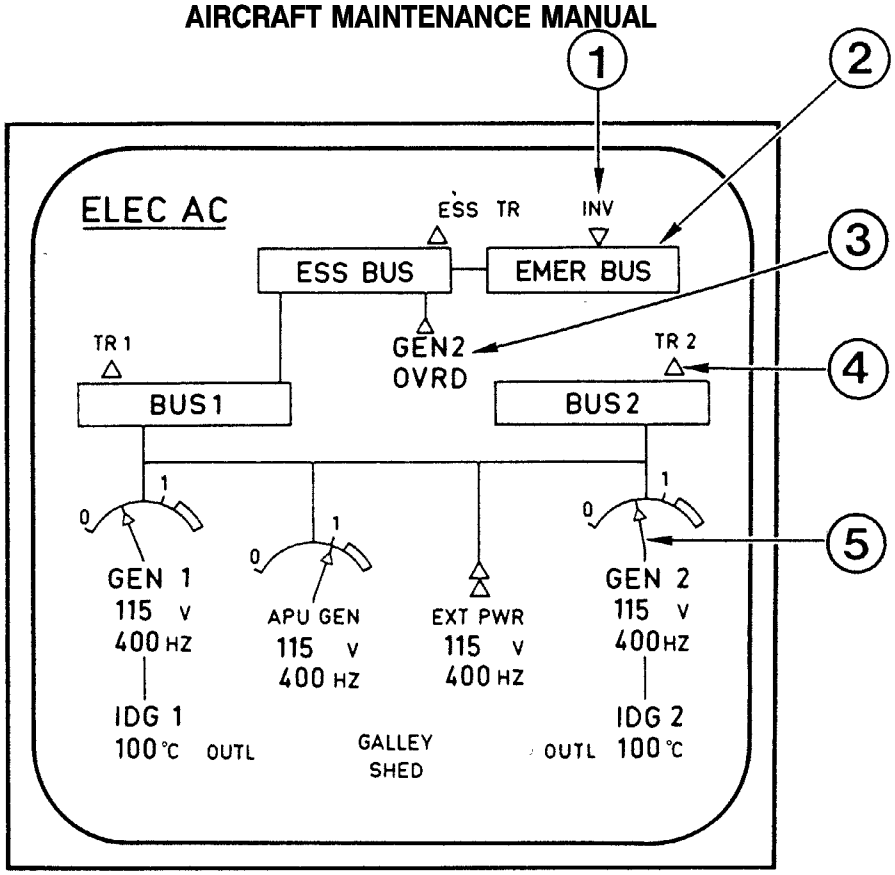
△ (W) : REPLACES VALVE INDICATION WHEN APU MASTER SW IS IN OFF POSITION

17 - GROUND SUPPLY (NOT DISPLAYED IN FLIGHT(

GND (W) : (INDEPENDANT OF GROUND SUPPLY CONNECTION)

BM5 31 51 00 0 AEK0 23 18
DM5

AIR BLEED System Display (3/3)
Figure 040



1 - EMERGENCY INVERTER (W)

2 - EMERGENCY BUS

3 - GENERATOR 1 OR 2 OVERRIDES AC BUS 1

GEN 1 OVRD (W) : GENERATOR 1 SUPPLIES AC ESS BUS

GEN 2 OVRD (W) : GENERATOR 2 SUPPLIES AC ESS BUS

GEN OVRD (W) : NO OVERRIDE

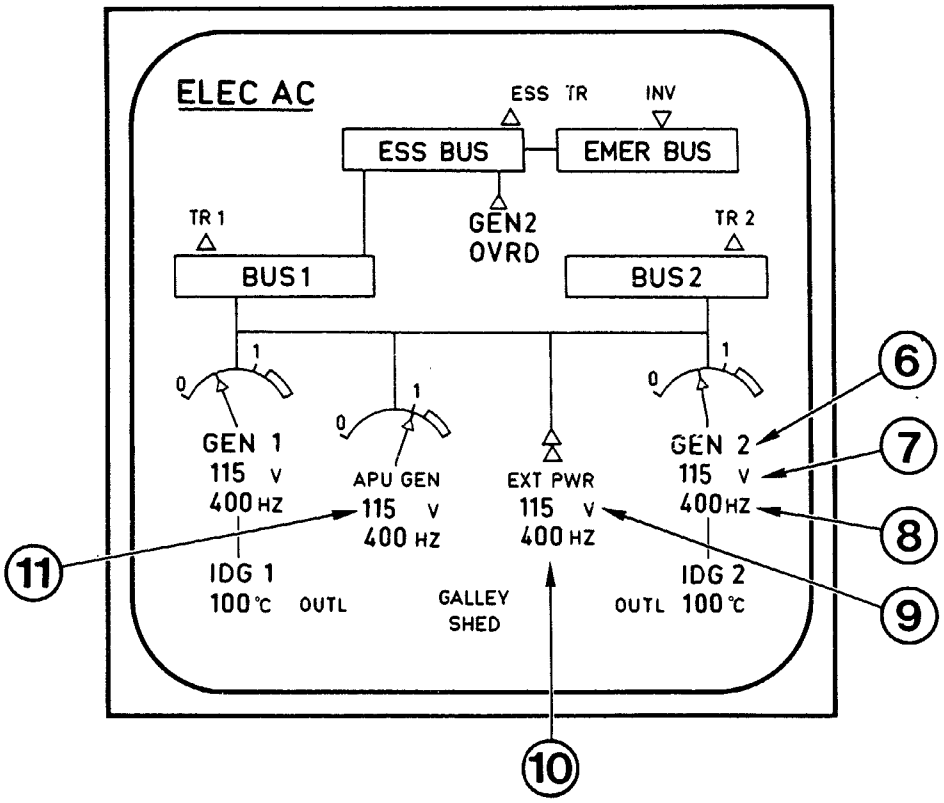
4 - AC BUS AND TRANSFORMER RECTIFIER

TR 2 (W)
(W)
BUS 2 (G) WHEN SUPPLIED
TR 2 (A)
(A)
BUS2 (A) WHEN NOT SUPPLIED

5 - GENERATOR LOAD (G)
(A) WHEN LOAD ≥ 110%
NOT DISPLAYED WHEN GEN P/B SWITCH IS SELECTED OFF/R

BM5 31 51 00 0 AEP0 -09-04
DM5

ELEC AC System Display (1/3)
Figure 041



6 - GEN 2 (W)
(A) WHEN GEN P/B SWITCH IS SELECTED OFF/R

7 - GENERATOR VOLTAGE (G)
(A) WHEN VOLTAGE ≤ 110V
≥ 120V
OFF (W) REPLACES VOLTAGE INDICATION WHEN GEN P/B SWITCH IS SELECTED OFF/R

8 - GENERATOR FREQUENCY (G)
(A) WHEN FREQUENCY ≤ 390 HZ
≥ 410 HZ
NOT DISPLAYED WHEN GEN P/B SWITCH IS SELECTED OFF/R

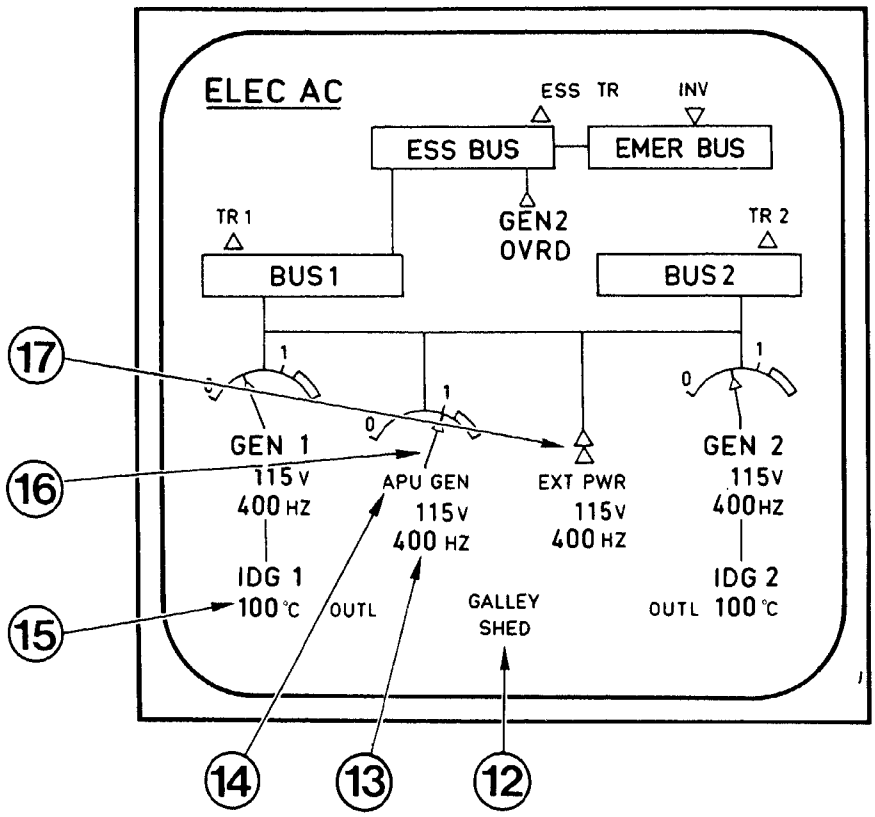
9 - EXTERNAL POWER VOLTAGE (G)
(A) WHEN VOLTAGE ≤ 110V
≥ 120V
NOT DISPLAYED WHEN EXTERNAL POWER VOLTAGE ≤ 50V

10 - EXTERNAL POWER FREQUENCY (G)
(A) WHEN FREQUENCY ≤ 390 HZ
≥ 410 HZ
NOT DISPLAYED WHEN EXTERNAL POWER VOLTAGE ≤ 50V

11 - APU GENERATOR VOLTAGE (G)
(A) WHEN VOLTAGE ≤ 110V
≥ 120V
OFF (W) REPLACES VOLTAGE INDICATION WHEN APU GEN P/B SWITCH IS SELECTED OFF/R - NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION

BMS 31 51 00 0 AEQO - 10
DM5

ELEC AC System Display (2/3)
Figure 042



12 - GALLEY SHED (NOT DISPLAYED IN NORMAL OPERATION)
(W) WHEN SHED

13 - APU GENERATOR FREQUENCY (G)
(A) WHEN FREQUENCY ≤ 390 HZ
≥ 416 HZ
NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION
OR APU GEN P/B SWITCH IS SELECTED OFF/R

14 APU GEN (W)
(A) WHEN APU GEN P/B SWITCH IS SELECTED OFF/R AND
APU MASTER SW IS IN ON POSITION

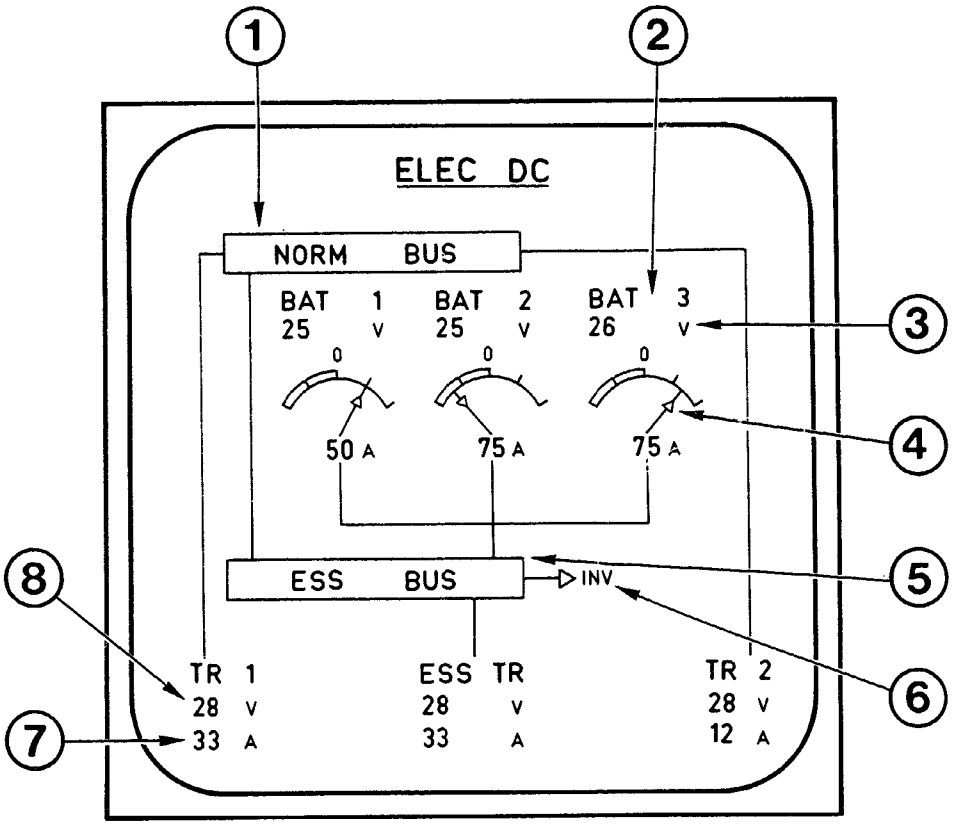
15 - IDG OUTLET OIL TEMPERATURE (G)
FLASHES WHEN t° ≥ 142°C
(A) WHEN t° ≥ 185°C

16 - APU GENERATOR LOAD (G)
(A) WHEN LOAD ≥ 110 %
△ (W) REPLACES LOAD INDICATION WHEN APU MASTER SWITCH
IS IN OFF POSITION

17 - EXT PWR AND △ (W) NOT DISPLAYED IN FLIGHT

BM5 31 51 00 0 AERO -09 -04
DM5

ELEC AC System Display (3/3)
Figure 043



1 - NORMAL BUS

NORM BUS (G) WHEN SUPPLIED

NORM BUS (A) WHEN NOT SUPPLIED

2 - BAT 3 (W)
(A) WHEN BAT P/B SWITCH IS SELECTED OFF/R

3 - BATTERY VOLTAGE (G)
(A) WHEN VOLTAGE ⩽ 25V
⩾ 31V

4 - BATTERY CURRENT (G)
(A) WHEN CURRENT ⩽ −5A
OFF (W) REPLACES DIGITAL AND ANALOG INDICATION
WHEN BAT P/B SWITCH IS SELECTED OFF/R AND
BATTERY CONTACTOR OFF
ARROW AND DIGITAL INDICATION
DISAPPEAR WHEN CONTACTOR OFF

5 - ESSENTIAL BUS

ESS BUS (G) WHEN SUPPLIED

ESS BUS (A) WHEN NOT SUPPLIED

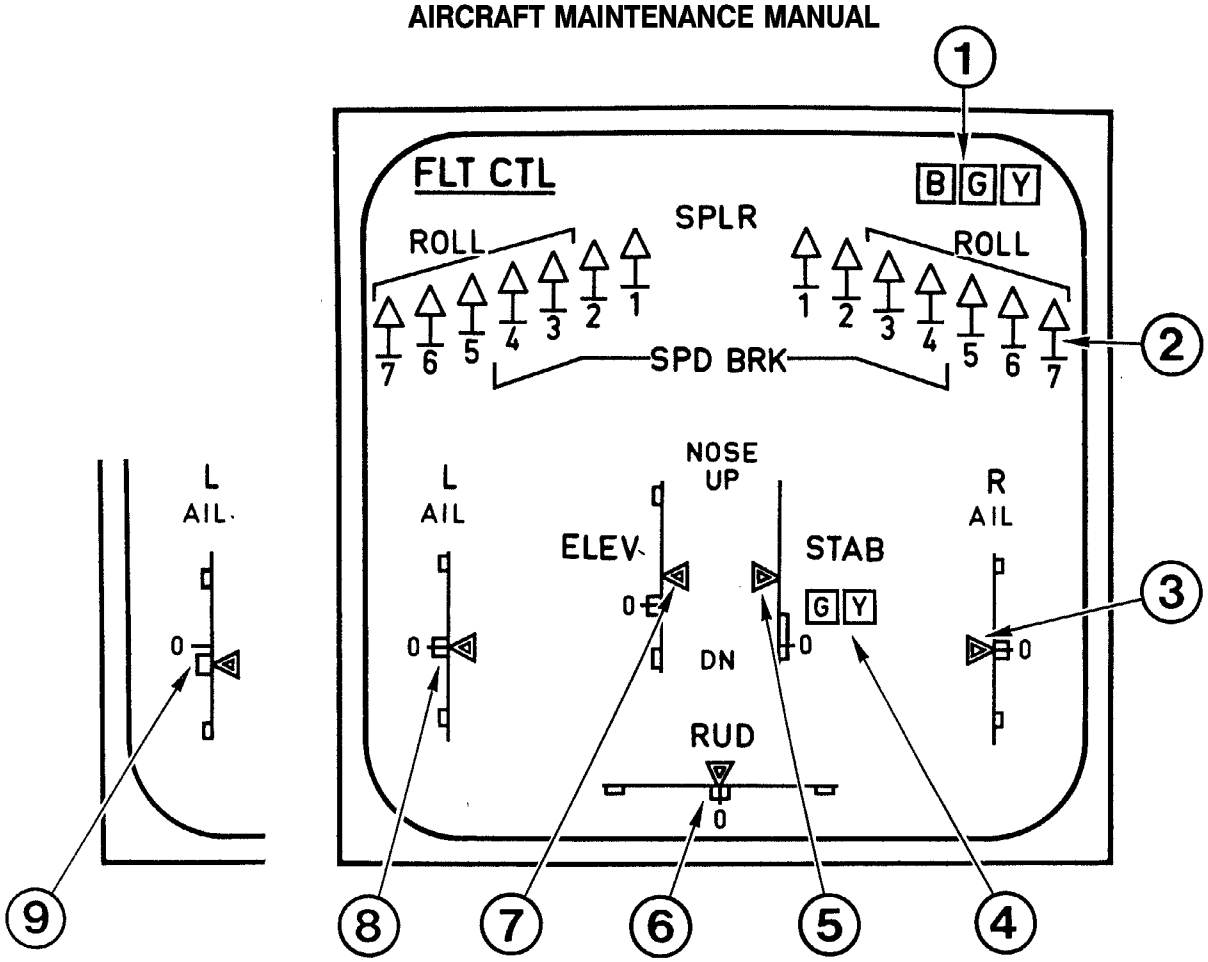
6 - EMERGENCY INVERTER (W)

7 - TRANSFORMER RECTIFIER CURRENT (G)
FLASHES WHEN I ⩽ 6A

8 - TRANSFORMER RECTIFIER VOLTAGE (G)
(A) : VOLTAGE ⩽ 25 V
⩾ 31 V

BM5 31 51 00 0 AEVO - 10
DM5

ELEC DC System Display
Figure 044



1 - SERVO CONTROL HYD PRESSURE (G)

(A) WHEN THERE IS A SERVO CONTROL LOW PRESSURE

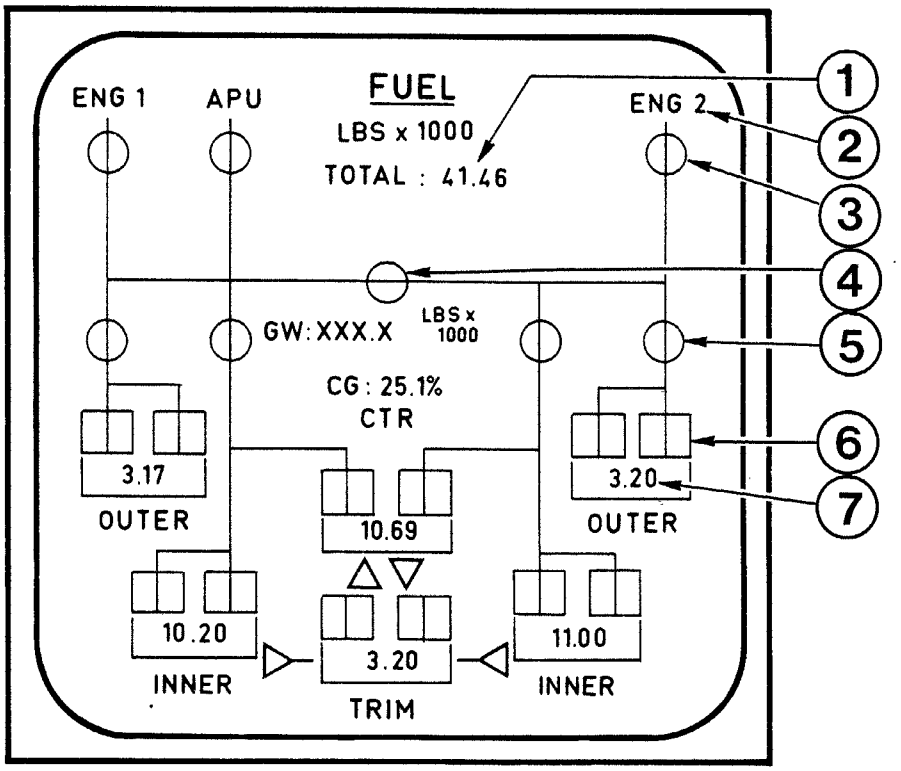
2 - SPOILER POSITION INDICATION

- (G) : SPOILER EXTENDED
- (A) : SPOILER EXTENDED AND FAULT
- 7 (G) : SPOILER RETRACTED
- 7 (A) : SPOILER RETRACTED AND FAULT
- (G) : FLASHES WHEN SPOILER EXTENDED ON GROUND AND SPEED > 70 KT

3 - AILERON POSITION (G)
4 - SERVO CONTROL HYD PRESSURE (G)
(A) WHEN THERE IS A SERVO CONTROL LOW PRESSURE
5 - HORIZONTAL STABILIZER POSITION (G)
6 - RUDDER POSITION (G)
7 - ELEVATOR POSITION (G)
8 - WHEN SLATS RETRACTED
9 - WHEN SLATS EXTENDED

BM5 31 51 00 0 AFB0 15

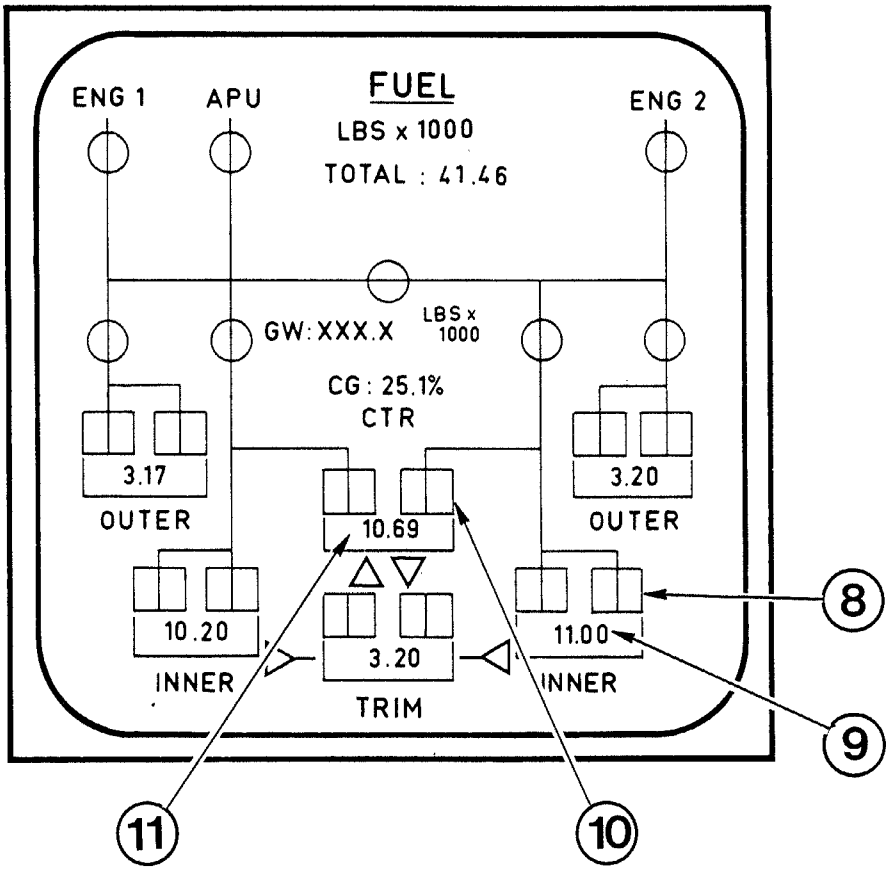
FLT CTL System Display
Figure 045



1 - TOTAL FUEL QUANTITY (G)
2 - ENG 2 (W)
(A) : WHEN NO FUEL PRESSURE
3 - LP VALVE (FIRE VALVE)
(G) : VALVE OPEN
(A) : VALVE OPEN WITHOUT FUEL PRESSURE
(A) : VALVE CLOSED
4 - X-FEED VALVE
(G) : VALVE OPEN
(A) : VALVE OPEN WITHOUT FUEL PRESSURE
(G) : VALVE CLOSED
5 - INNER AND OUTER TANK ISOLATION VALVE
(G) : VALVE OPEN
(A) : VALVE OPEN WITHOUT FUEL PRESSURE
(A) : VALVE CLOSED
6 - OUTER TANK PUMP
(G) : PUMP ON AND NORMAL PRESSURE
(A) : PUMP ON AND LOW PRESSURE
(A) : PUMP OFF
7 - OUTER TANK FUEL QUANTITY (G)
FLASHES WHEN FUEL UNBALANCED ≥ 6.0 LBS x 1000

BM5 31 51 00 0 FTR0 24 19
DM5

FUEL System Display (1/3)
Figure 046



8 - INNER TANK PUMP
- (G) : PUMP ON
- (A) : PUMP ON AND LOW PRESSURE
- (A) : PUMP SW OFF
- (G) : PUMP SW ON AND CONTACTOR OFF

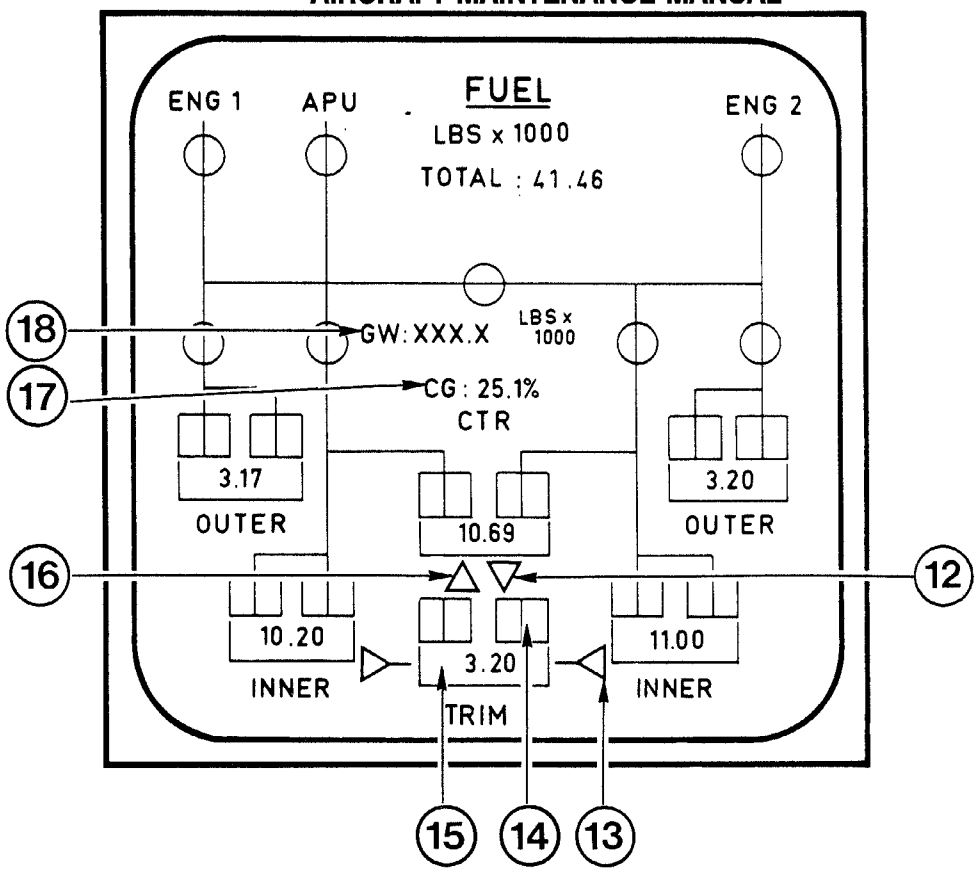
9 - INNER TANK FUEL QUANTITY (G)
FLASHES WHEN
FUEL UNBALANCED ≥ 6.00 LBS x 1000

10 - CENTER TANK PUMP
- (G) : PUMP ON
- (A) : PUMP ON AND LOW PRESSURE
- (A) : PUMP SW OFF
- (G) : PUMP SW ON AND CONTACTOR OFF

11 - CENTER TANK FUEL QUANTITY (G)

BM5 31 51 00 0 FTV0 24 19
DM5

FUEL System Display (2/3)
Figure 047



12 - TRANSFER INDICATION FROM CTR TO TRIM TANK
- (G) : AFT TRANSFER
- (A) : AFT TRANSFER FAULT OR NOT ALLOWED

13 - TRANSFER INDICATION FROM INNER TO TRIM TANK
- (G) : AFT TRANSFER
- (A) : AFT TRANSFER FAULT OR NOT ALLOWED

14 - TRIM TANK PUMP
- (G) : PUMP ON
- (A) : PUMP ON AND LOW PRESSURE
- (A) : PUMP SW OFF
- (G) : PUMP SW ON AND CONTACTOR OFF

15 - TRIM TANK FUEL QUANTITY (G)

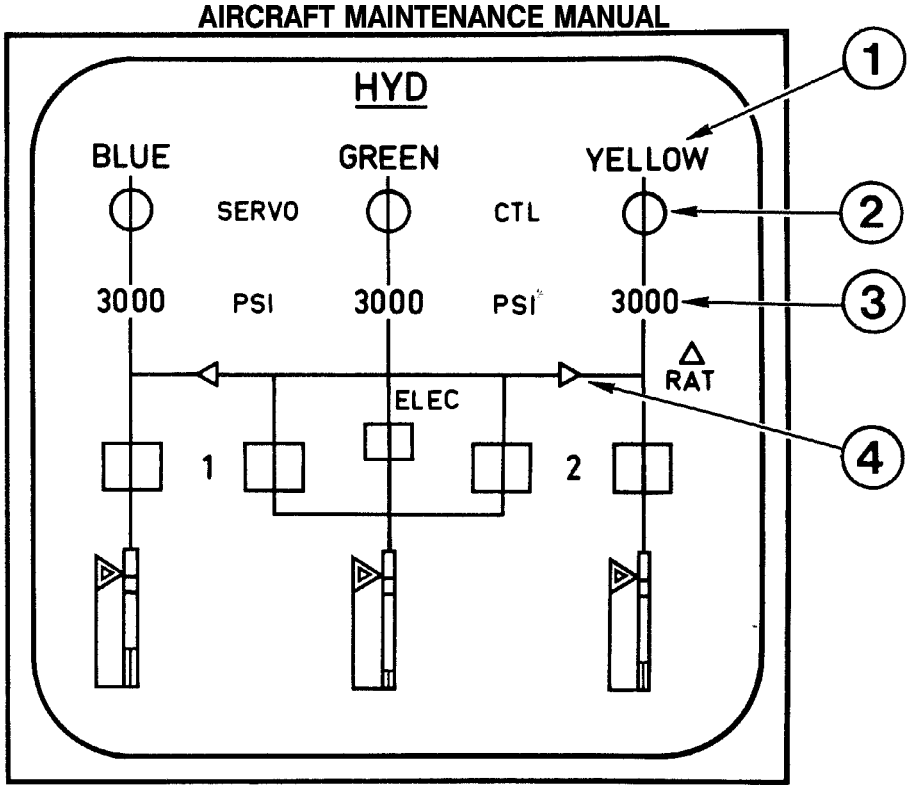
16 - TRANSFER INDICATION FROM TRIM TO CTR TANK
- (W) : NO TRANSFER, WHEN TRANSFER CONTROL FAULT
- (G) : FWD TRANSFER
- (A) : FWD TRANSFER FAULT

17 - CG INDICATION (G)
- (A) : WHEN CG > 40 % ≤ 17.5 %

18 - GROSS WEIGHT INDICATION (G)

BM5 31 51 00 0 FTY0 24

FUEL System Display (3/3)
Figure 048



1 - YELLOW (W)
(A) WHEN THERE IS A SERVO CONTROL LOW PRESSURE

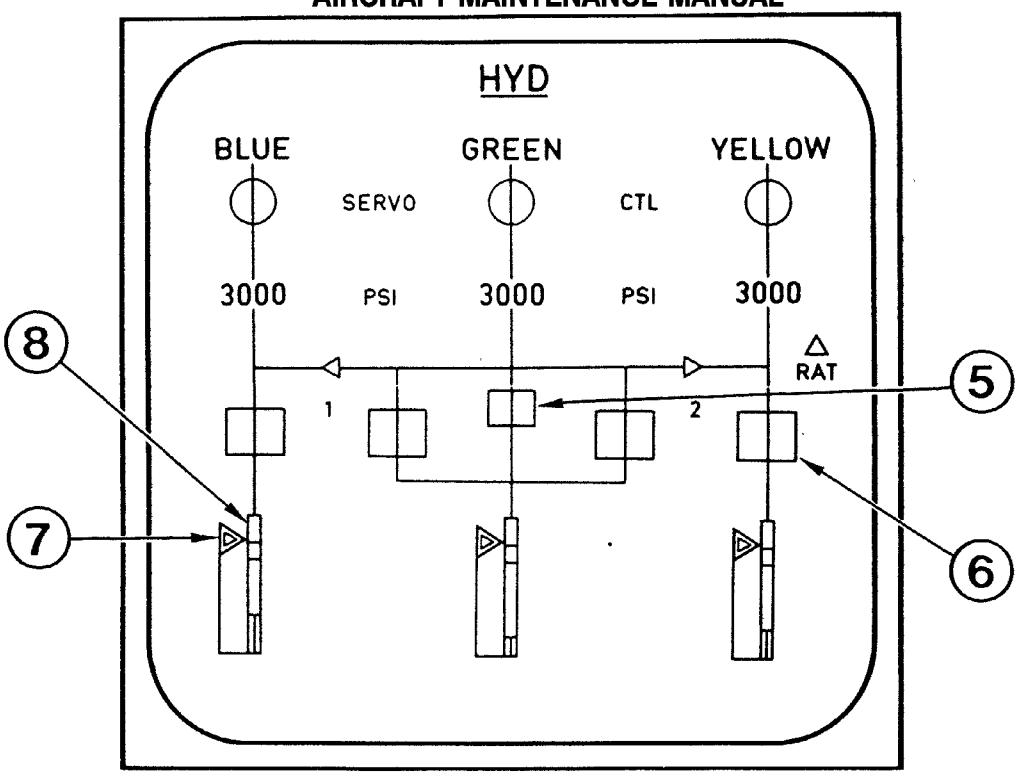
2 - SERVO CONTROL VALVE
(G) : VALVE OPEN
(A) : VALVE OPEN AND PRESSURE ≤ 1450 PSI
(A) : VALVE CLOSED

3 - COLLECTOR PRESSURE (G)
(A) WHEN PRESSURE≤ 1450 PSI

4 - POWER TRANSFER UNIT
(G) : WHEN PTU P/B SWITCH IS SELECTED OFF
(G) : WHEN PTU P/B SWITCH IS SELECTED ON

BM5 31 51 00 0 AFPO - 10
DM5

HYD System Display (1/2)
Figure 049



5 - ELECTRIC PUMPS

(G) - PUMPS OFF

(G) : ONE PUMP ON

LO (A) : PUMP ON AND LOW PRESSURE

6 - ENGINE PUMP

(A) - PUMPS OFF

(G) : ONE PUMP ON

LO (A) : PUMP ON AND LOW PRESSURE

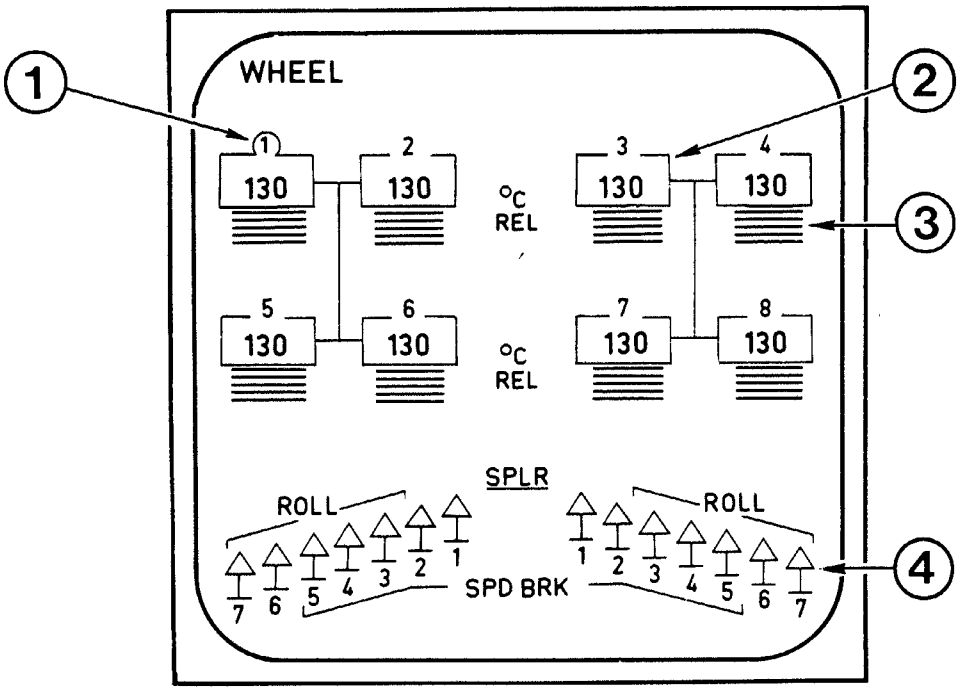
7 - HYDRAULIC FLUID QUANTITY (G)

(A) WHEN QUANTITY ≤ 5 LITERS

8 - NORMAL FULL RESERVOIR MARK (W)

BM5 31 51 00 0 AFQO -09 -04
DM5

HYD System Display (2/2)
Figure 050



1 - (1) INDICATES WHEEL WITH THE HOTTEST TEMPERATURE
IF TEMPERATURE ABOVE 100°C

2 - BRAKES TEMPERATURE (G)
(A) WHEN TEMPERATURE ≥ 300°C

3 - BRAKE RELEASE

(G) : BRAKE RELEASED
NOT DISPLAYED WHEN BRAKE NOT RELEASED

4 - SPOILER POSITION INDICATION

(G) : SPOILER EXTENDED

(A) : SPOILER EXTENDED AND FAULT

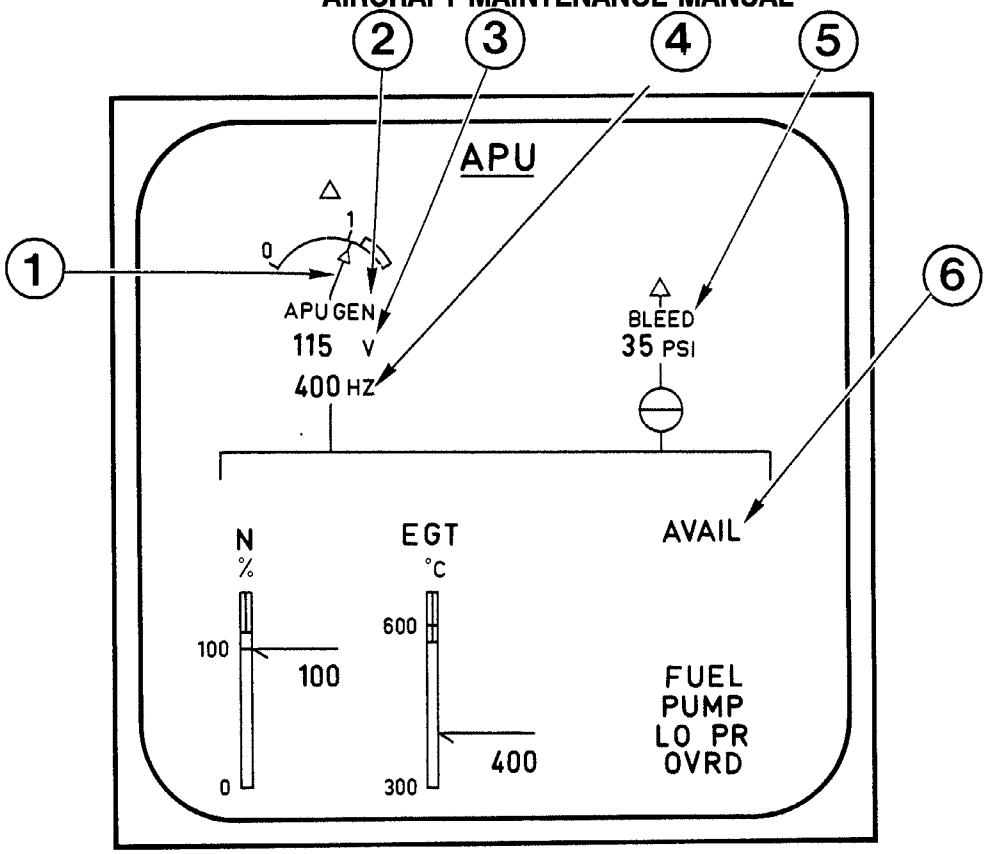
(G) : SPOILER RETRACTED

(A) : SPOILER RETRACTED AND FAULT

(G) : FLASHES WHEN SPOILER EXTENDED ON GROUND AND SPEED ≥ 70 KT

BM5 31 51 00 0 SVC0 15

WHEEL System Display
Figure 051



1 - APU GENERATOR LOAD (G)

(A) WHEN LOAD ⩾ 110%

△ (W) REPLACES LOAD INDICATION WHEN APU MASTER SW IS IN OFF POSITION

2 - APU GEN (W)

(A) WHEN APU GEN P/B SWITCH IS SELECTED OFF/R AND APU MASTER SW IS IN ON POSITION

3 - APU GENERATOR VOLTAGE (G)

(A) WHEN VOLTAGE ⩽ 110V
⩾ 120V
OFF (W) REPLACES VOLTAGE INDICATION WHEN APU GEN P/B SWITCH IS SELECTED OFF/R
NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION

4 - APU GENERATOR FREQUENCY (G)

(A) WHEN FREQUENCY ⩽ 390 HZ
⩾ 416 HZ
NOT DISPLAYED WHEN APU MASTER SW IS IN OFF POSITION OR APU GEN P/B SWITCH IS SELECTED OFF/R

5 - APU BLEED PRESSURE (G)

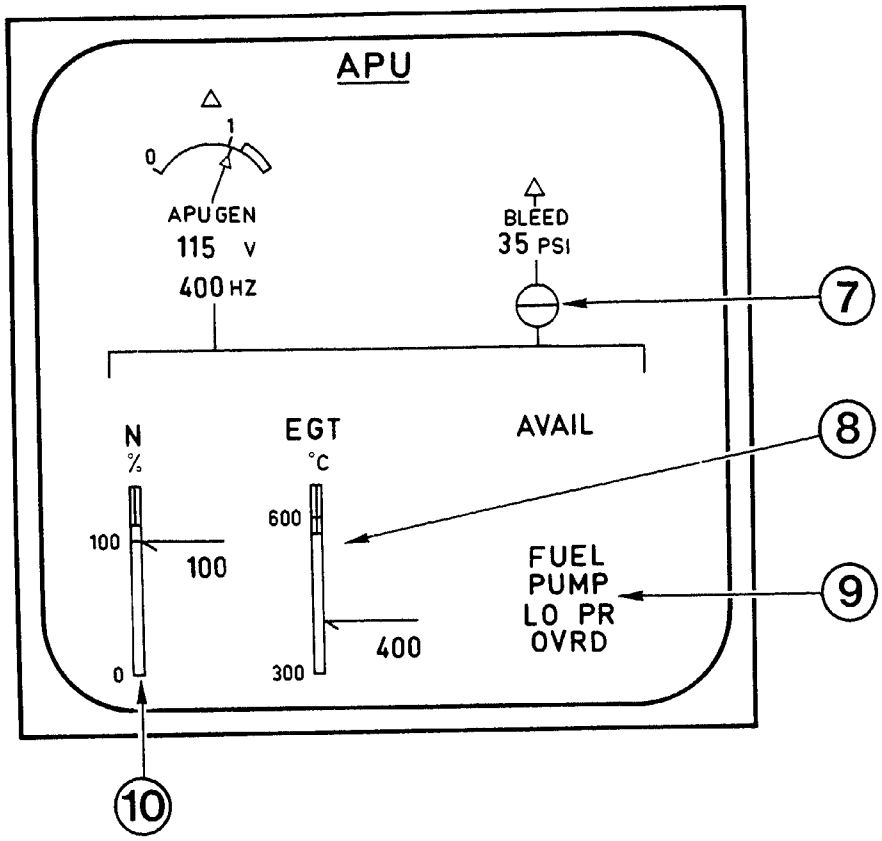
(A) WHEN PRESSURE ⩾ 57 PSI

NOT DISPLAYED WHEN BLEED VALVE CLOSED
XX(A) IF POWER SUPPLY LOSS FOR CONTROLLER INDICATOR

6 - AVAIL (NOT DISPLAYED)
AVAIL (C) WHEN ⩾ 95% AND APU MASTER SW IS IN ON POSITION

BM5 31 51 00 0 AGB1 25 20
DM5

APU System Display (1/2)
Figure 052



7 - APU BLEED VALVE

(G) . VALVE FULLY OPEN

(G) VALVE CLOSED (NOT FULLY OPEN)

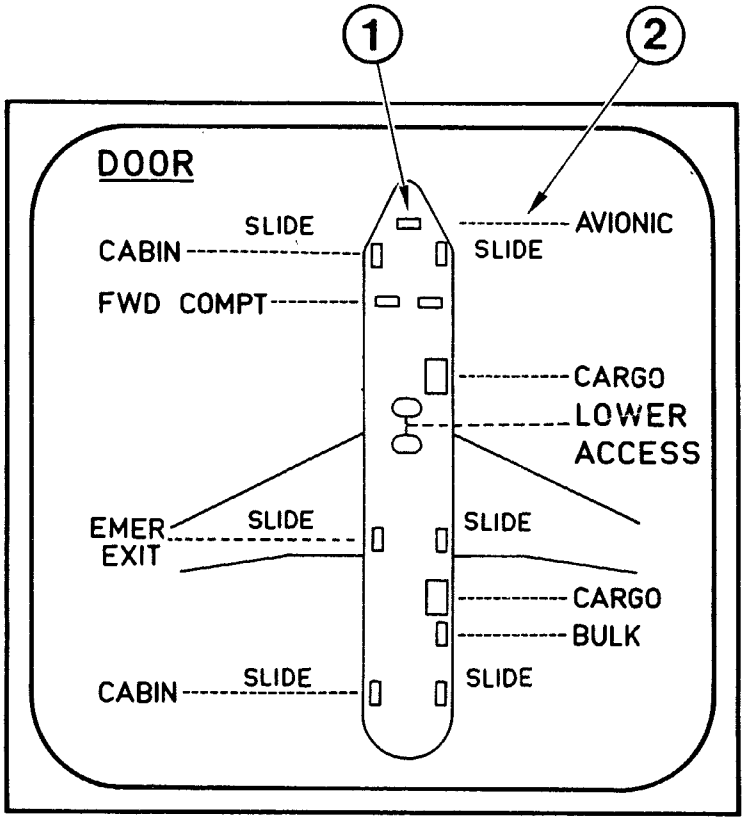
8 - APU EXHAUST GAS TEMPERATURE (G)
FLASHES WHEN EGT ⩾ 540°C.
(A) WHEN EGT ⩾ 585°C

9 - FUEL PUMP (W) WHEN LO PRESS OR OVRD
LO PR (A) WHEN FUEL LO PRESS
OVRD (G) WHEN FUEL PUMP SW IS SELECTED IN OVERRIDE POSITION
NOT DISPLAYED IN NORMAL OPERATION

10 - APU RPM (G)
(A) WHEN N ⩾ 107 %

BM5 31 51 00 0 AGC0 -09-04
DM5

APU System Display (2/2)
Figure 053



1 - ▭ (G) ---------- AVIONIC (W) (W) DOOR LOCKED

▭ (A) ---------- AVIONIC (A) (A) : DOOR NOT LOCKED

2. SLIDE (W) : WHEN CABIN SLIDE ARM
NOTHING DISPLAYED WHEN CABIN SLIDE DISARM.

BM5 31 51 00 0 AGHO - 10

DOOR System Display
Figure 054

EFFECTIVITY: 101-200,

R

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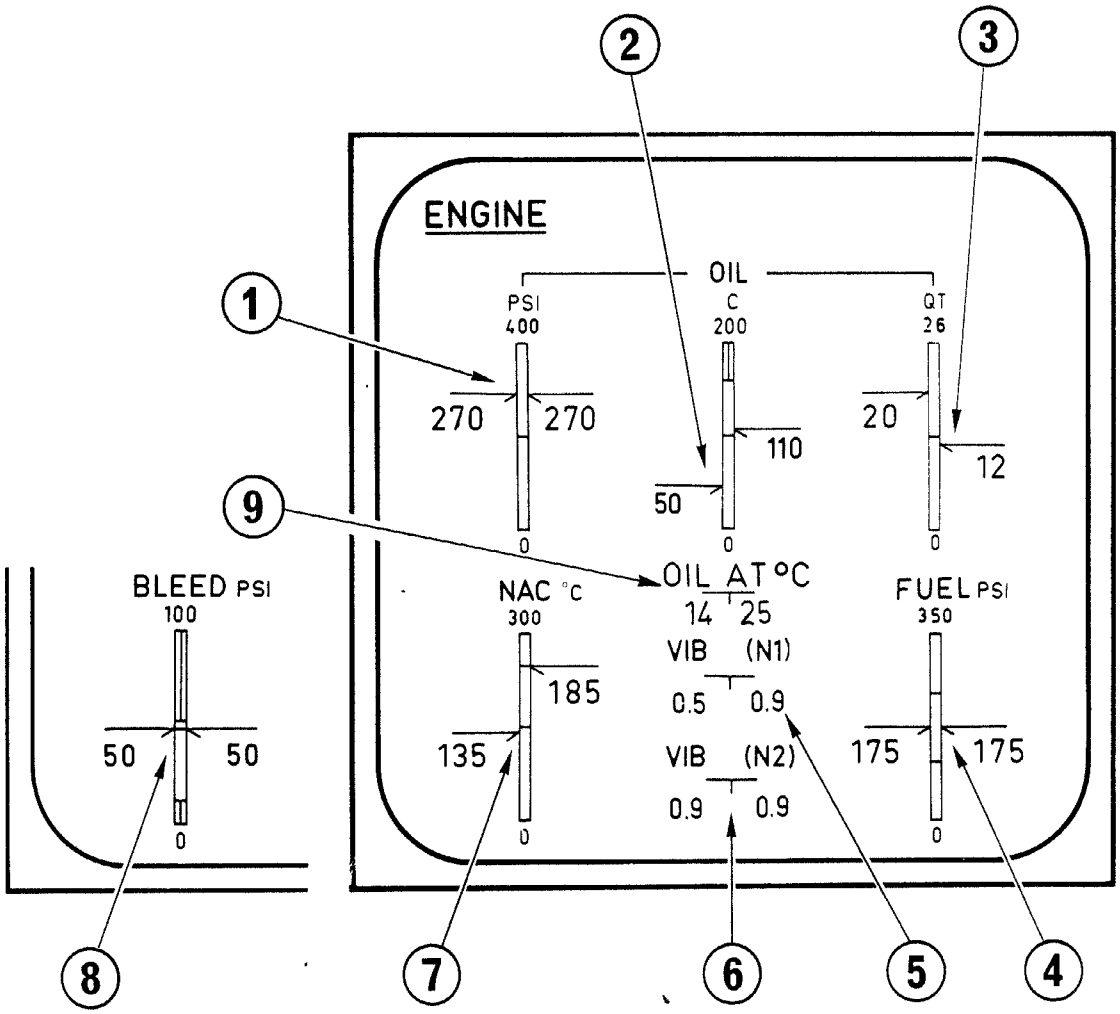


1 - OIL PRESSURE (G)
FLASHES WHEN P ≤ 75 PSI
(R) WHEN P ≤ 70 PSI
XX(A) IF POWER SUPPLY LOSS
FOR CONTROLLER INDICATOR

2 - OIL TEMPERATURE (G)
FLASHES WHEN t ≥ 163°C
(A) WHEN t ≥ 177°C

3 - OIL QUANTITY (G)
FLASHES WHEN QUANTITY ≤ 4 QTS
XX(A) IF POWER SUPPLY LOSS
FOR CONTROLLER INDICATOR

4 - FUEL PRESSURE (G)

5 - ENGINE VIBRATION (N1) (G)
FLASHES WHEN VIBRATION ≥ 3 UNITS

6 - ENGINE VIBRATION (N2) (G)
FLASHES WHEN VIBRATION ≥ 5 UNITS

7 - NACELLE TEMPERATURE (G)
FLASHES WHEN t ≥ + 230°C
NOT DISPLAYED DURING STARTING SEQUENCE
(REPLACED BY BLEED PRESSURE INDICATION)

8 - BLEED PRESSURE (G)
(A) WHEN PRESSURE ≤ 8 PSI
≥ 57 PSI

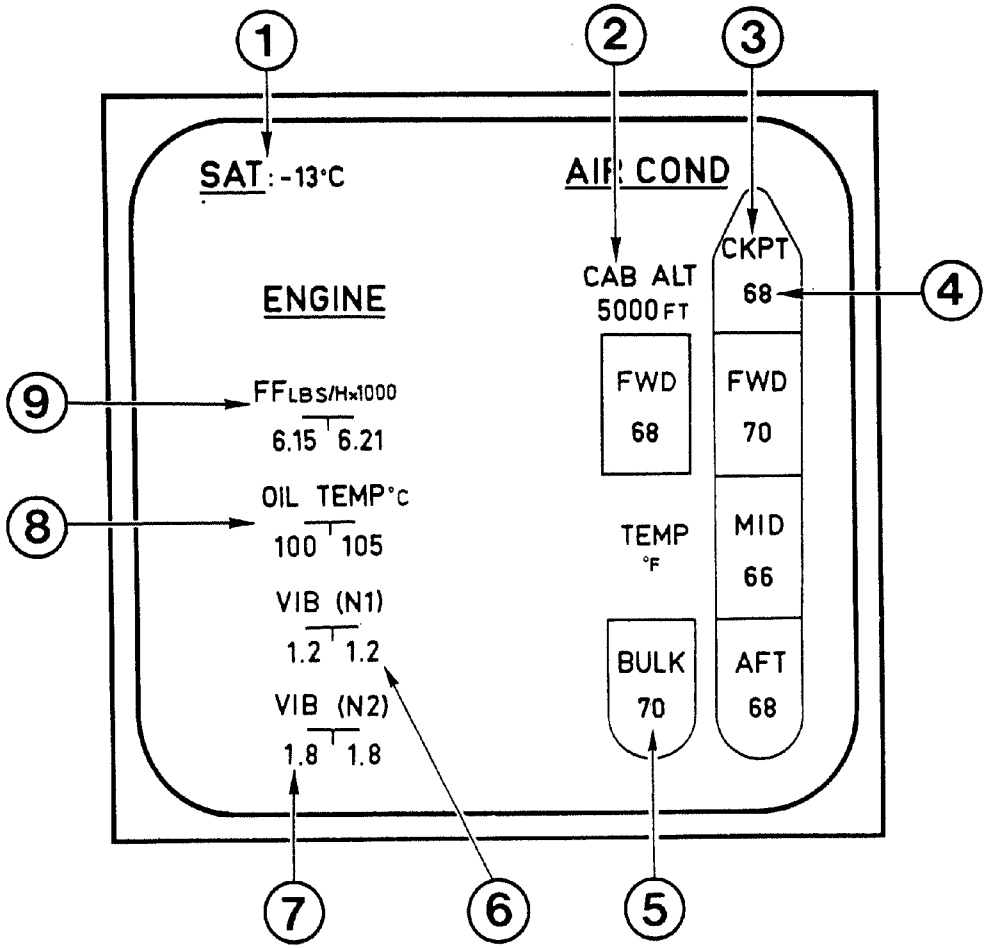
* DISPLAYED DURING STARTING SEQUENCE
IF TAT (ADC BUS) NOT AVAILABLE
THIS ADVISORY WILL BE SUPPRESSED
XX(A) IF POWER SUPPLY LOSS
FOR CONTROLLER INDICATOR

9 - OIL Δ T (G)
FLASHES WHEN Δ T ≥ 44°C

BM5 31 51 00 0 AGS1 25 20
DM5

ENGINE System Display
Figure 055

R 13 CRUISE (Ref. Fig. 056)



1 - STATIC AIR TEMPERATURE (G)

2 - CABIN ALTITUDE (G)
(R) WHEN ALTITUDE ≥ 10000 Ft

3 - COMPARTMENT IDENTIFIER (W)
(A) WHEN DUCT t° ≥ 190°F

4 - COMPARTMENT TEMPERATURE (G)

5 - CARGO COMPARTMENT TEMPERATURE (G)
FLASHES WHEN t° > 92°F

6 - ENGINE VIBRATION N1 (G)
FLASHES WHEN VIBRATION ≥ 5 UNITS

7 - ENGINE VIBRATION N2 (G)
FLASHES WHEN VIBRATION ≥ 7.5 UNITS

8 - OIL TEMPERATURE (G)
FLASHES WHEN t° ≥ 163°C
(A) WHEN t° ≥ 177°C

9 - FUEL FLOW (G)
XX (A) IF POWER SUPPLY LOSS
FOR CONTROLLER INDICATOR

BM5 31 51 00 0 CHE0 00

CRUISE System Display
Figure 056

(3)System display operational mode

Four modes of operation are provided for the system pages defined hereupon.

Three modes are automatic, one is manual.

(a)Automatic mode related to a failure

As soon as a warning is detected by the FWC, the R ECAM display unit automatically shows the relevant system page (if any) associated with the first message displayed on the L ECAM display unit.

This mode allows the crew to cross-check on the system display the part of system no longer usable and to follow the result of corrective action.

(b)Automatic advisory mode (in flight only)

NOTE : All advisories are inhibited at anytime on ground and until slat retraction after take off.

When a parameter drifts out of normal range the relevant system page is automatically displayed on the R ECAM display unit to attract crew attention well before reaching the warning level.

When an advisory situation occurs, the mention ADV is written in white beside the title.

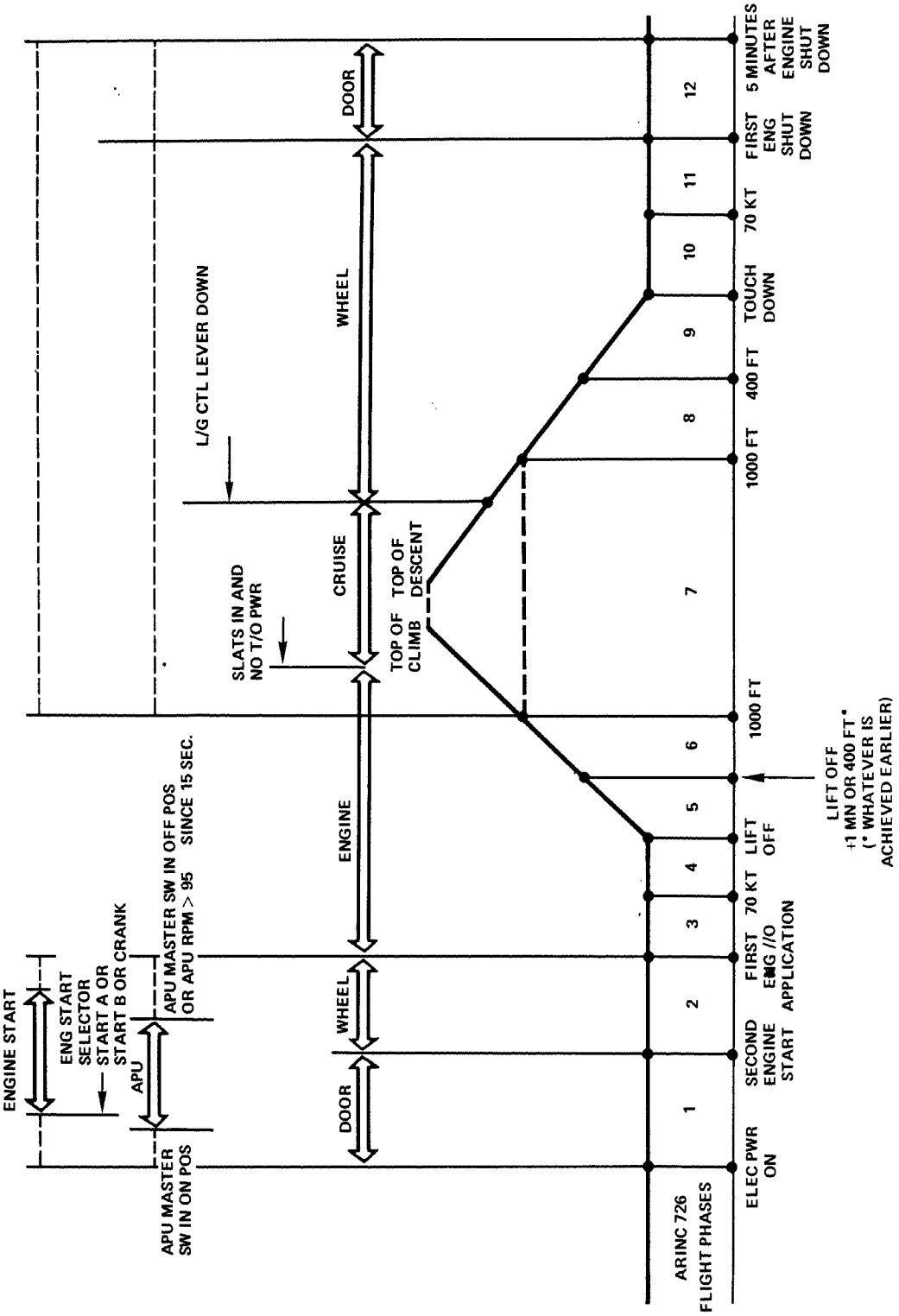
The parameter which triggers the advisory mode is pulsing smoothly.

- Parameters monitored by the advisory mode :

	ATA	PARAMETER
	21	TURBINE INLET TEMP ≥ 95°C AND ≤ 120°C
		CARGO COMPT TEMP > 92°F
R		CAB PRESS ≥ 8.6 psi NO ADVISORY IN AMBER RANGE
R		VERTICAL SPEED ≥ V/S SELECTED + 50% NO ADVISORY IN AMBER
R		RANGE
R		FWD VALVE POSITION ≠ AFT VALVE POSITION +40% NO ADVISORY
R		IN AMBER RANGE
	24	IDG OUTLET TEMP ≥ 142°C AMBER RANGE WHEN ≥ 185°C
		TR CURRENT ≤ 6A
	27	WHEN A/C IS ON GROUND ANY SPOILER OUT AND NOT FAILED, ARROW
		IS FLASHING AS FOR AN ADVISORY MODE IF WHEEL SPEED ≥ 70Kt
	28	FUEL UNBALANCED ≥ 6000 LBS
	49	EGT ≥ 540°C AMBER RANGE WHEN ≥ 585°C
	77	OIL QTY ≤ 4 QTS
		OIL TEMP ≥ 163°C AMBER RANGE WHEN ≥ 177°C
		NAC TEMP ≥ 200°C
		NAC HEAT ≥ 70%, AMBER RANGE WHEN ≥ 90°C
		N1 VIB ≥ 3 U
		N2 VIB ≥ 5 U
		FUEL TEMP ≤ -2°C
		OIL PRESSURE ≤ 38 PSI ; RED WHEN P ≤ 35 PSI

(c)Manual mode
The R ECAM display unit shows the system page selected by the crew on the ECAM control panel. This mode enables to select the system pages listed in sub-para L. (2)(c) except the cruise page.
(d)Automatic mode related to the flight phase
This mode is engaged only when the other modes are not engaged. The R ECAM display unit automatically shows the system page related to the present flight phase. (Ref. Fig. 057)

(4)Modes priority
(a)Mode 1 - Automatic mode related to a failure
This mode has priority over all the others but can be superseded if a system page is called manually. It is disengaged if the warning message is cleared by means of the CLR P/B switch or if the failure conditions have disappeared.
(b)Mode 2 - Automatic advisory mode
This mode has priority over modes 3 and 4. It is disengaged if the corresponding system P/B switch is pressed or if another system is called manually.
A system page displayed in advisory mode and disengaged can only be called again in advisory mode if the parameter monitored goes below then above its advisory level. Disengagement is automatic when a warning occurs or when the parameter is back to normal.
(c)Mode 3 - Manual mode
This mode can be engaged at any time but is disengaged if mode 1 or 2 is engaged.
(d)Mode 4 - Automatic mode related to the flight phase
This mode is automatically engaged if the other modes are not engaged.



BM5 31 51 00 0 AHH0 23 18
DM5

Automatic Mode Related to the Flight Phase
Figure 057

6. Operational Rules

A. Use of the ECAM System
(1)Preflight
- check :
both SGUs.....ON
FAULT and OFF legends.....OFF
Mode and System P/B SW LTS and legends.....OFF
- adjust display units brightness
(2)In flight
(a)Without aircraft system failure
- Automatic mode related to the flight phase
(Ref. Fig. 030)
- Manual mode
(Ref. Fig. 031)
- Automatic advisory mode
(Ref. Fig. 032)
(b)With an independent aircraft system failure
(Ref. Fig. 058, 059, 060)
(Ref. Fig. 029, 033, 061)
(c)With a primary aircraft system failure
(Ref. Fig. 021, 022, 023)
(Ref. Fig. 024, 025, 026)
(Ref. Fig. 027, 028)

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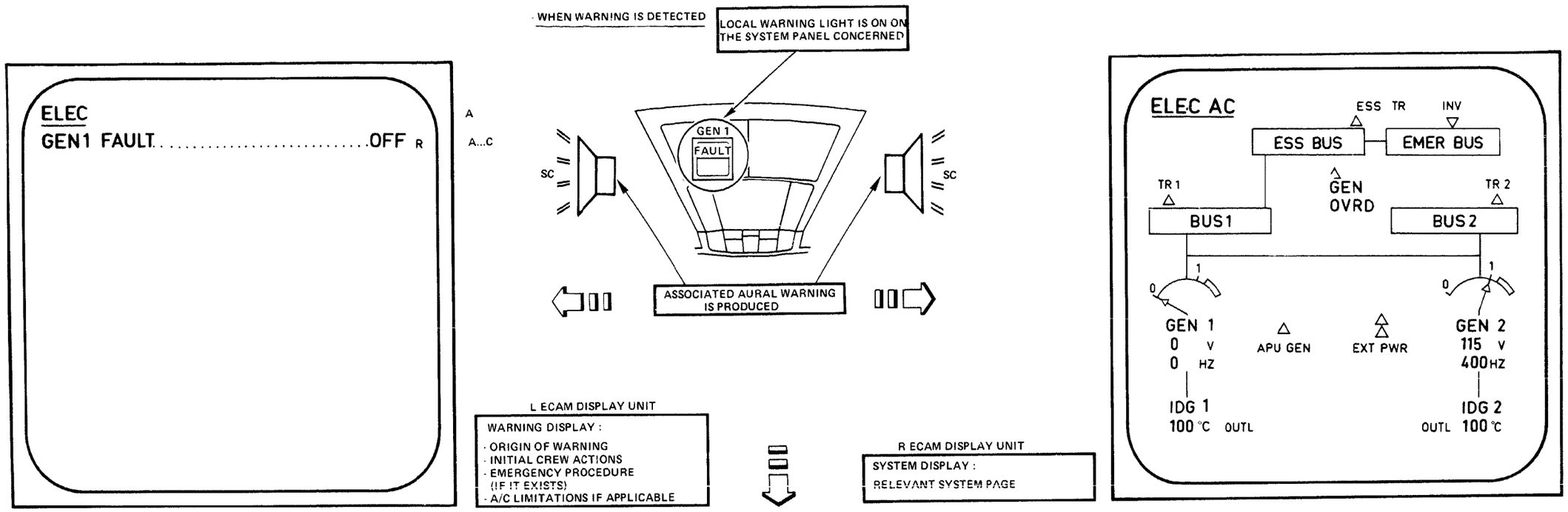
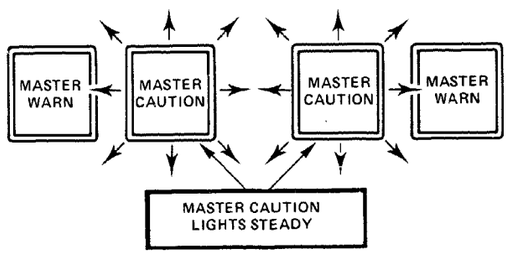
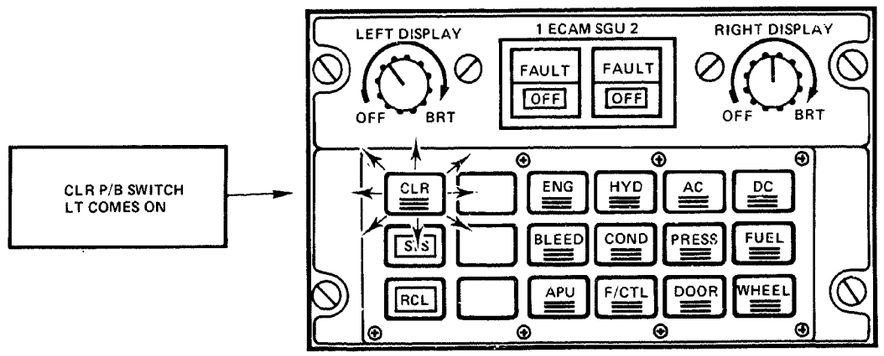
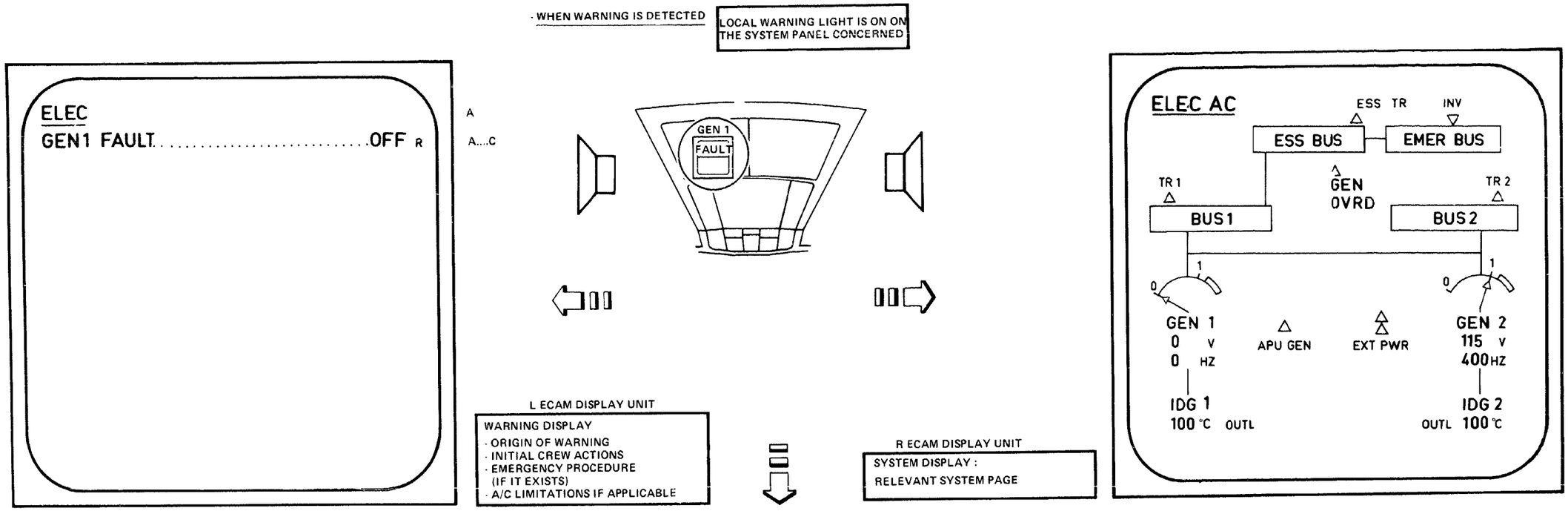


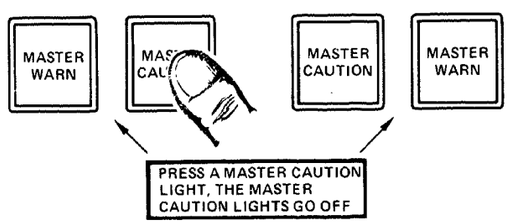


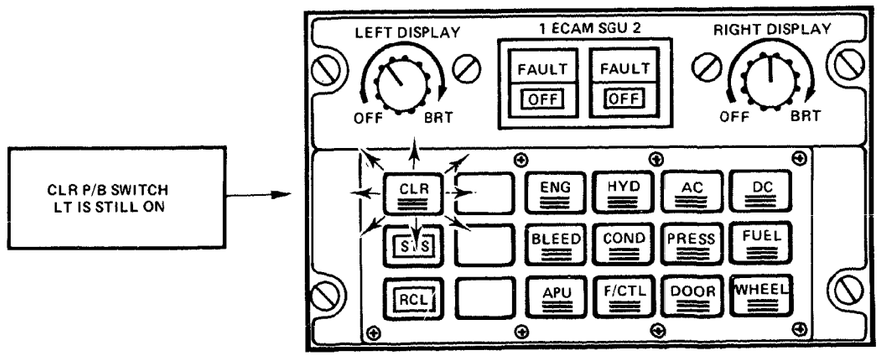


BM5 31 51 00 0 SVZO 14 09
DM5

Operation with an Independent Aircraft System
Failure When Warning is Detected
Figure 058







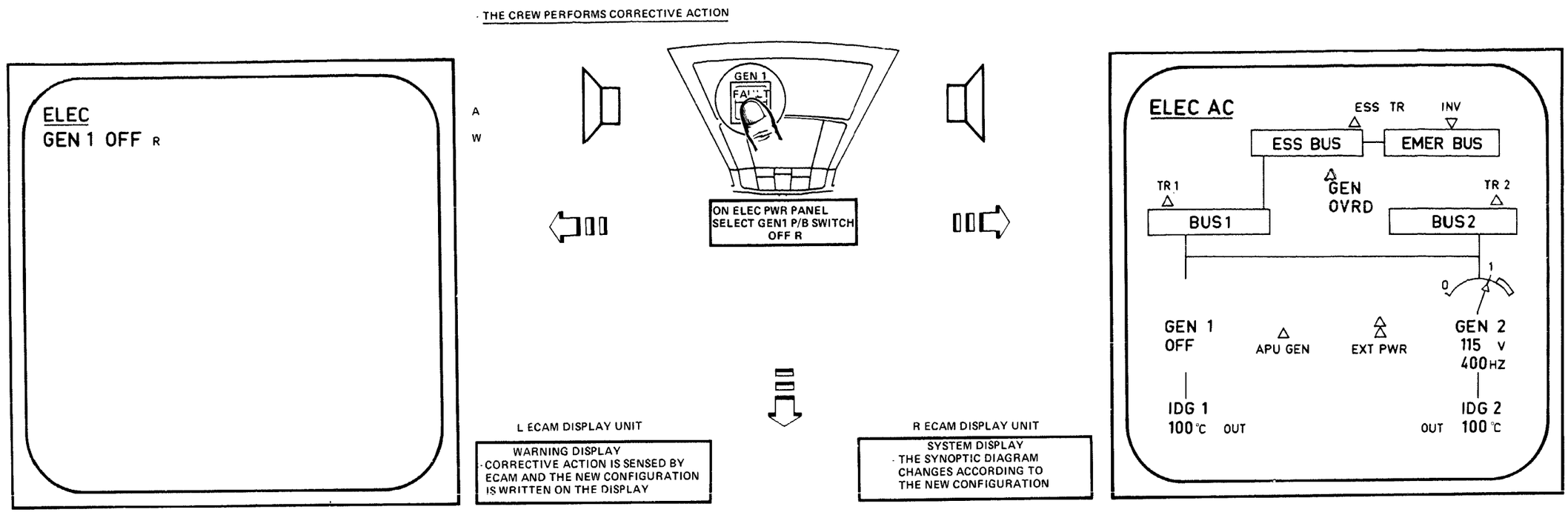
BM5 31 51 00 0 SWCO 14 09
DM5

Operation with an Independent Aircraft System Failure
MASTER CAUTION Lights Extinguishing
Figure 059

EFFECTIVITY: 101-200,

R

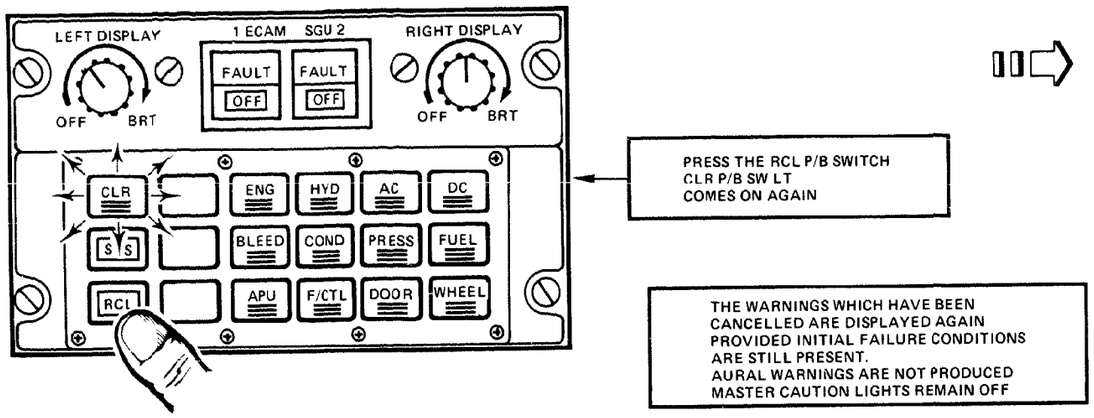
PIA

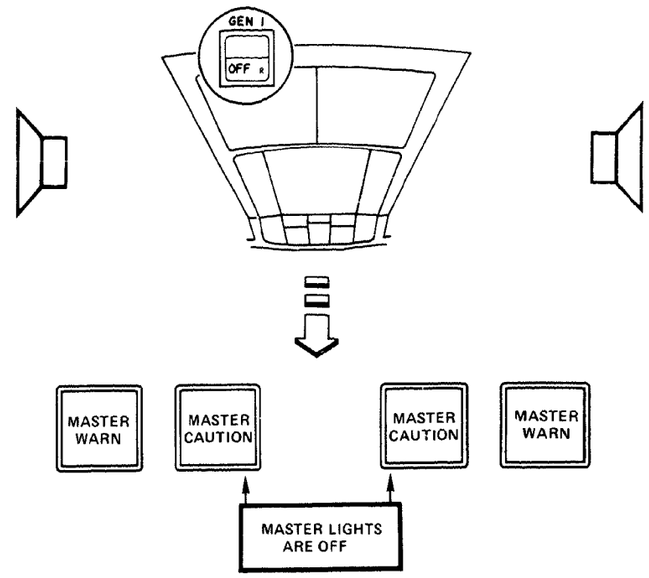


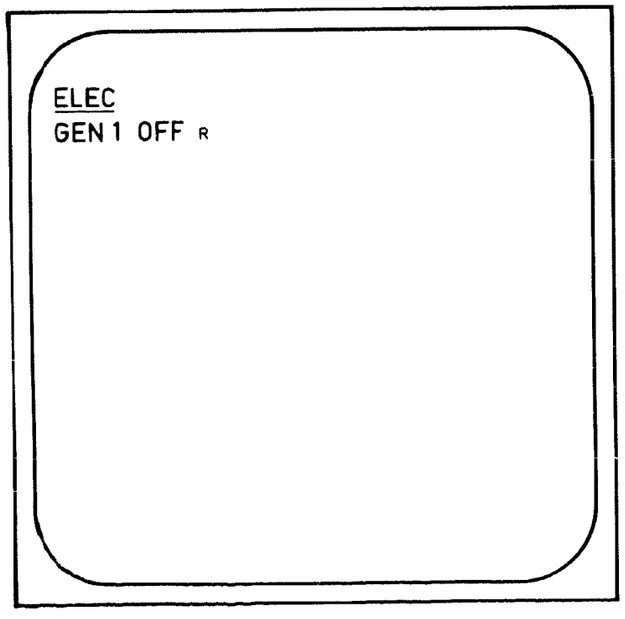
BM5 31 51 00 0 SWFO 14 09
DM5

Operation with an Independent Aircraft System Failure
The Crew Performs Corrective Action
Figure 060

- PLAY BACK OF THE FAILURE SEQUENCE : RECALL

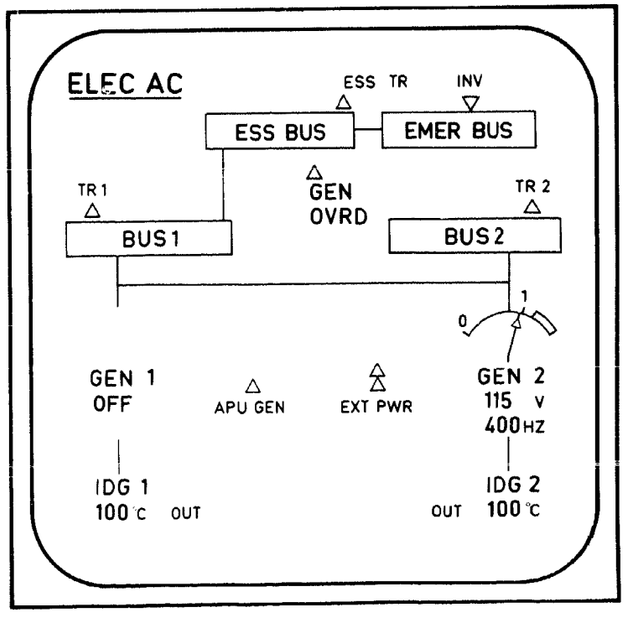






A
W

WARNING DISPLAY



SYSTEM DISPLAY

BM5 31 51 00 0 SWRO.14.09
DM5

Operation with an Independent Aircraft System Failure
Play Back of the Failure Sequence - RECALL
Figure 061

7. Operation in the Event of an ECAM Unit Failure

Operation after failure of one or another unit of the ECAM system has been optimized and the following configurations can be found.

A. FWC 1 or 2 Failure

(Ref. Fig. 062, 063, 064)
(Ref. Fig. 065, 066, 067)
(Ref. Fig. 068, 069, 070)

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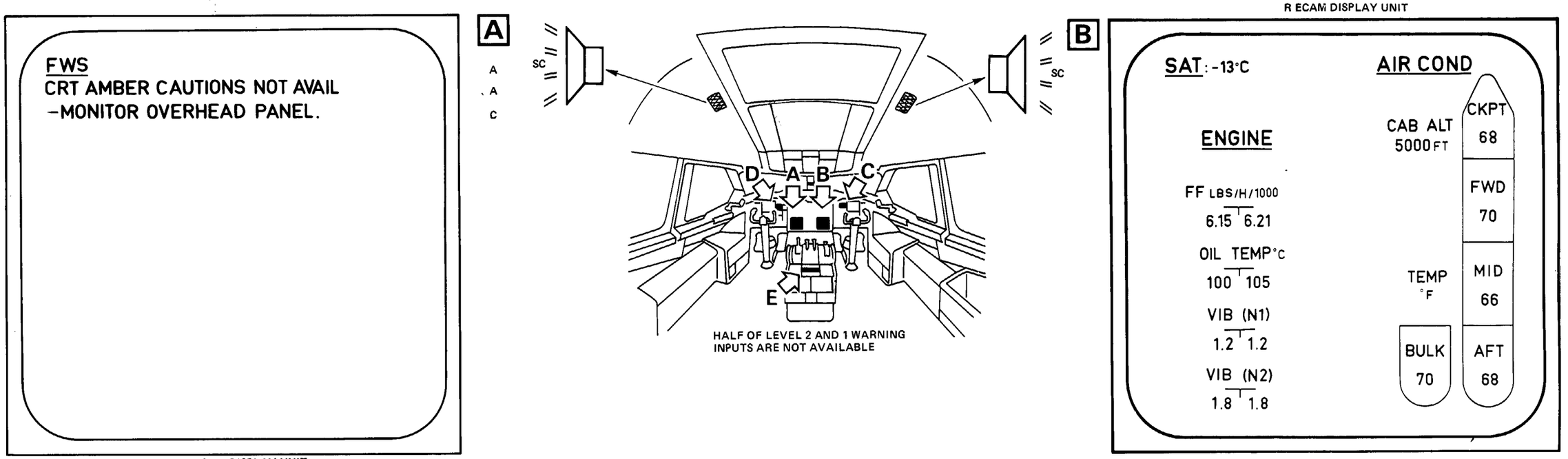
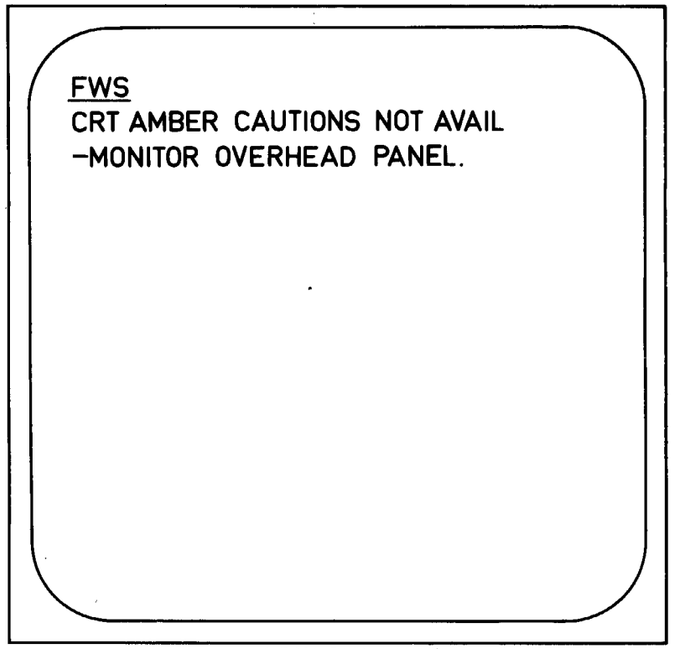


BM5 31 51 00 0 FXWO 18

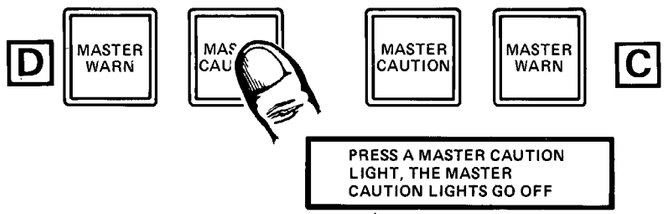
Operation with an FWC Failure when the Warning is Detected
FWC1 Failure
Figure 062

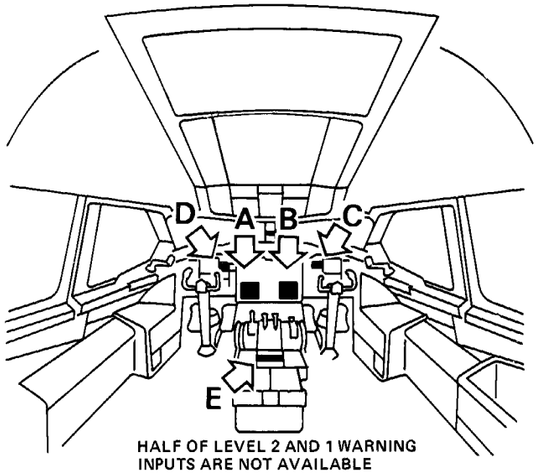
R EFFECTIVITY: 101-200,

PIA

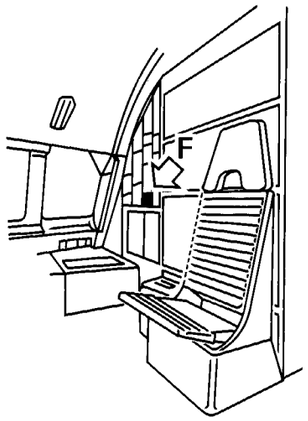


L ECAM DISPLAY UNIT
PRESENTS THE MESSAGE

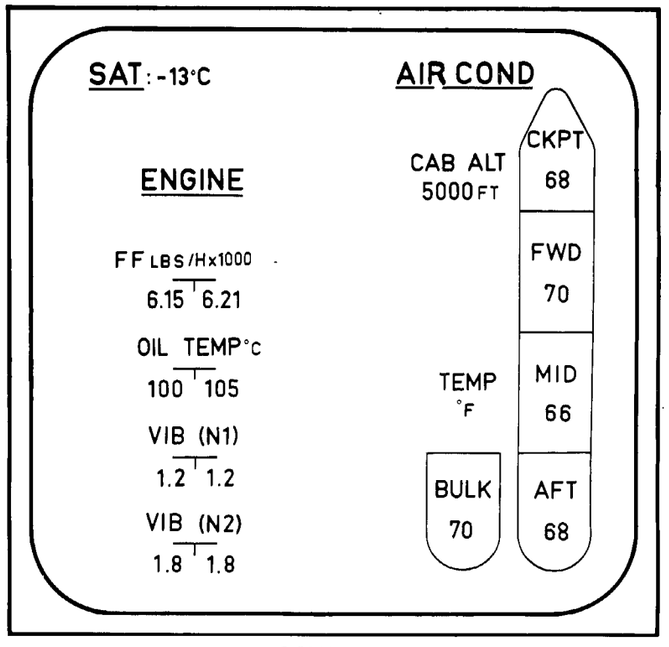




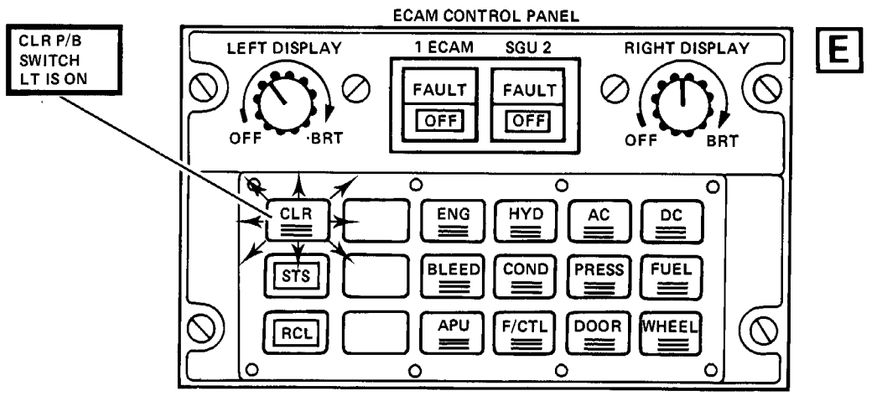
HALF OF LEVEL 2 AND 1 WARNING
INPUTS ARE NOT AVAILABLE

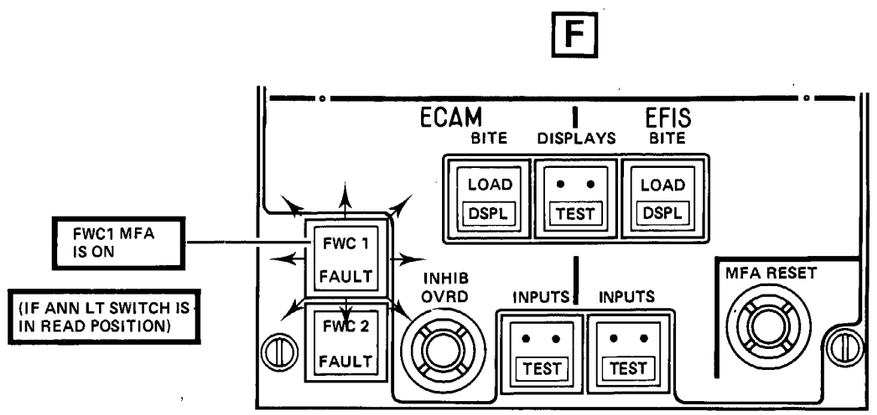


OPERATION WITH A FWC FAILURE
MASTER CAUTION LIGHTS EXTINGUISHING
FWC1 FAILURE



R ECAM DISPLAY UNIT

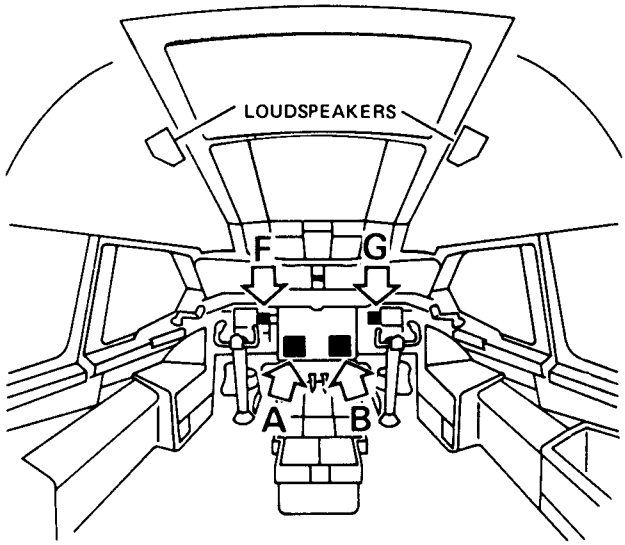


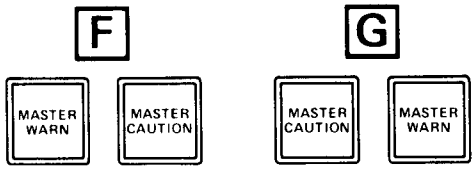


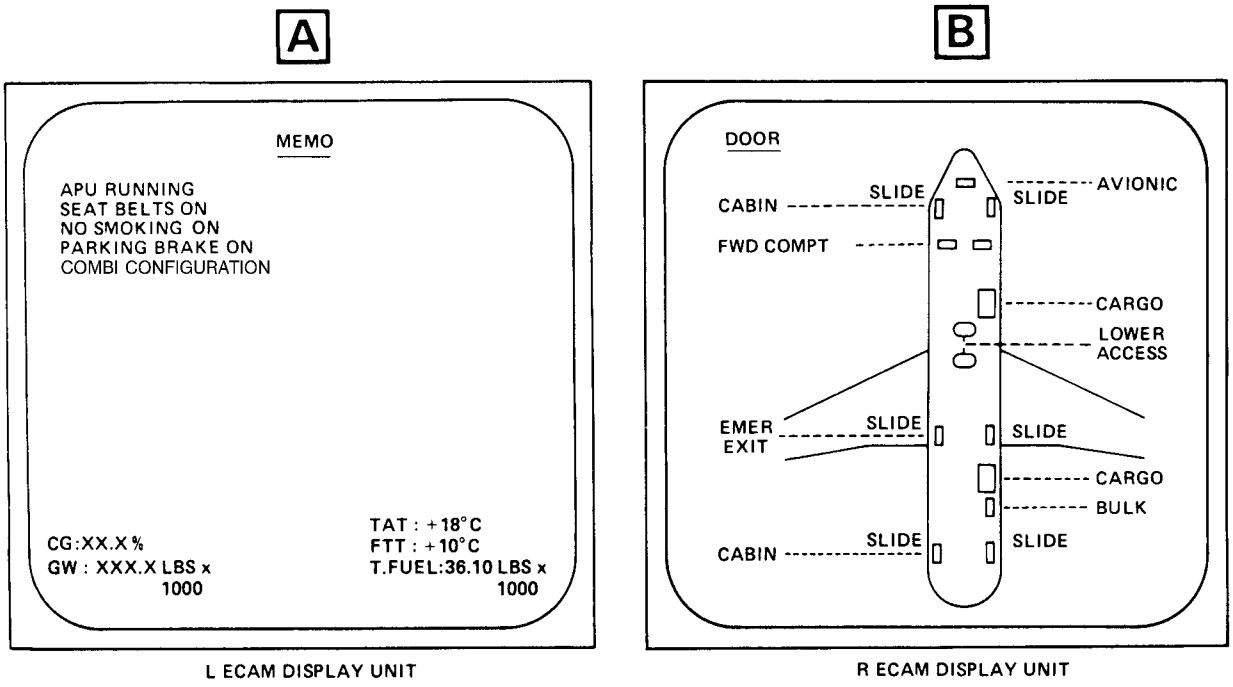
ECAM MAINTENANCE PANEL

BM5 31 51 00 0 FXZO 18

Operation with an FWC Failure - MASTER CAUTION Lights Extinguishing - FWC1 Failure
Figure 063







L ECAM DISPLAY UNIT

R ECAM DISPLAY UNIT

BM5 31 51 00 0 FTC0 00

Operation with an FWC Failure - Clearing of the Warning
FWC1 Failure
Figure 064

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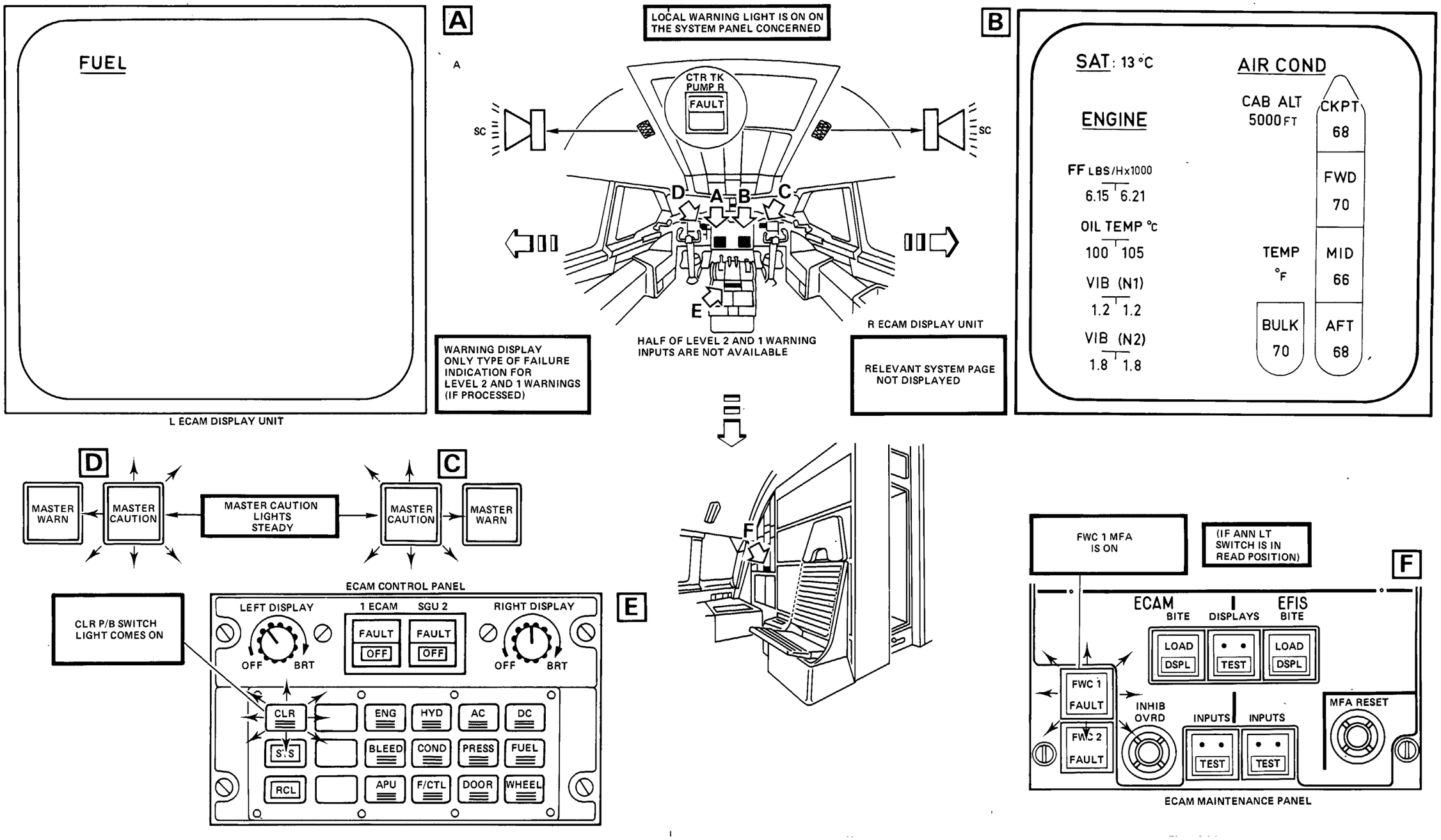

BM5 31 51 00 0 FYFO 18

Operation with an FWC Failure (FWC1) - Center Tank R Pump
LO PR Warning Detected
Figure 065

EFFECTIVITY: 101-200,

R

PIA

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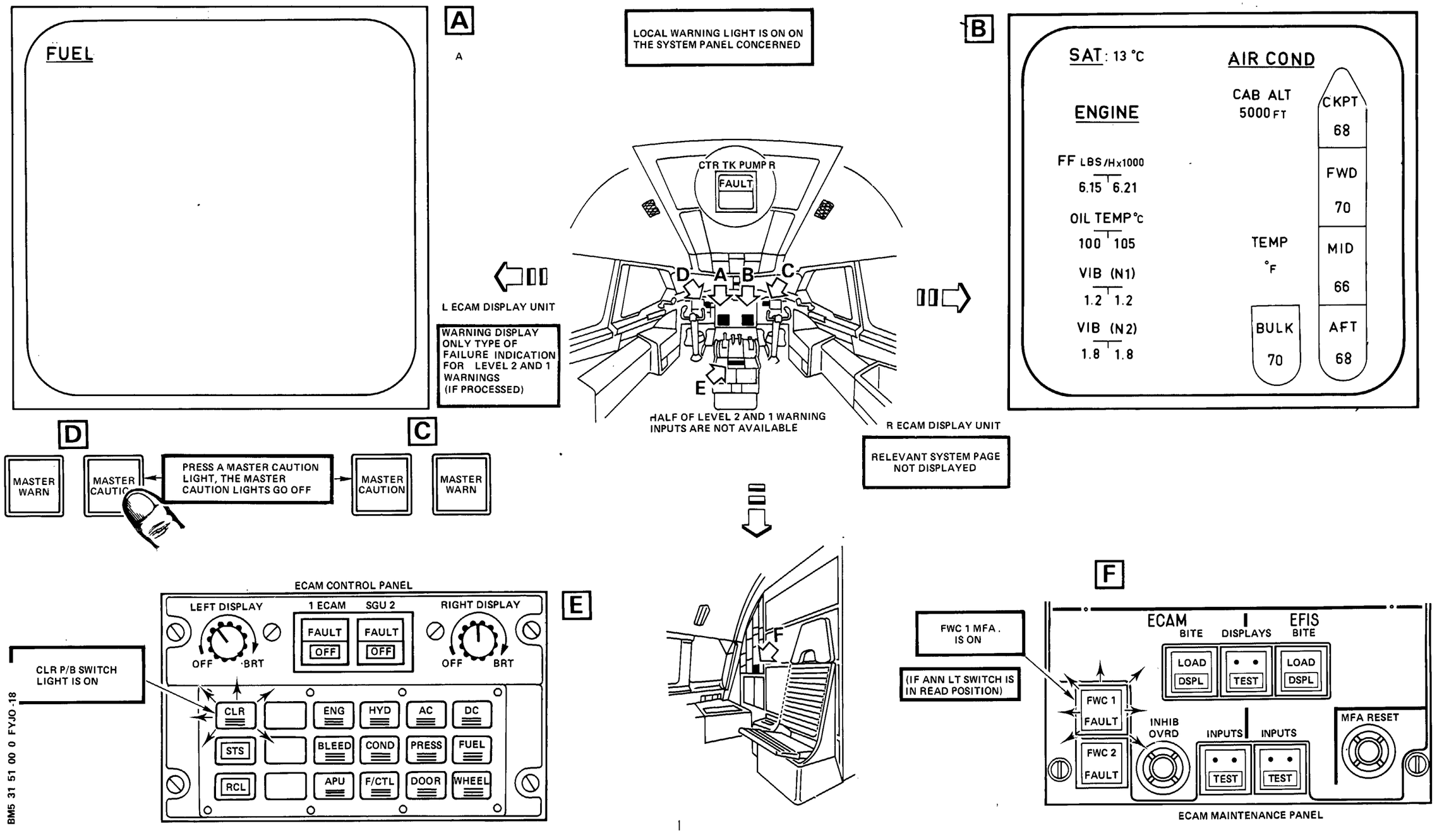
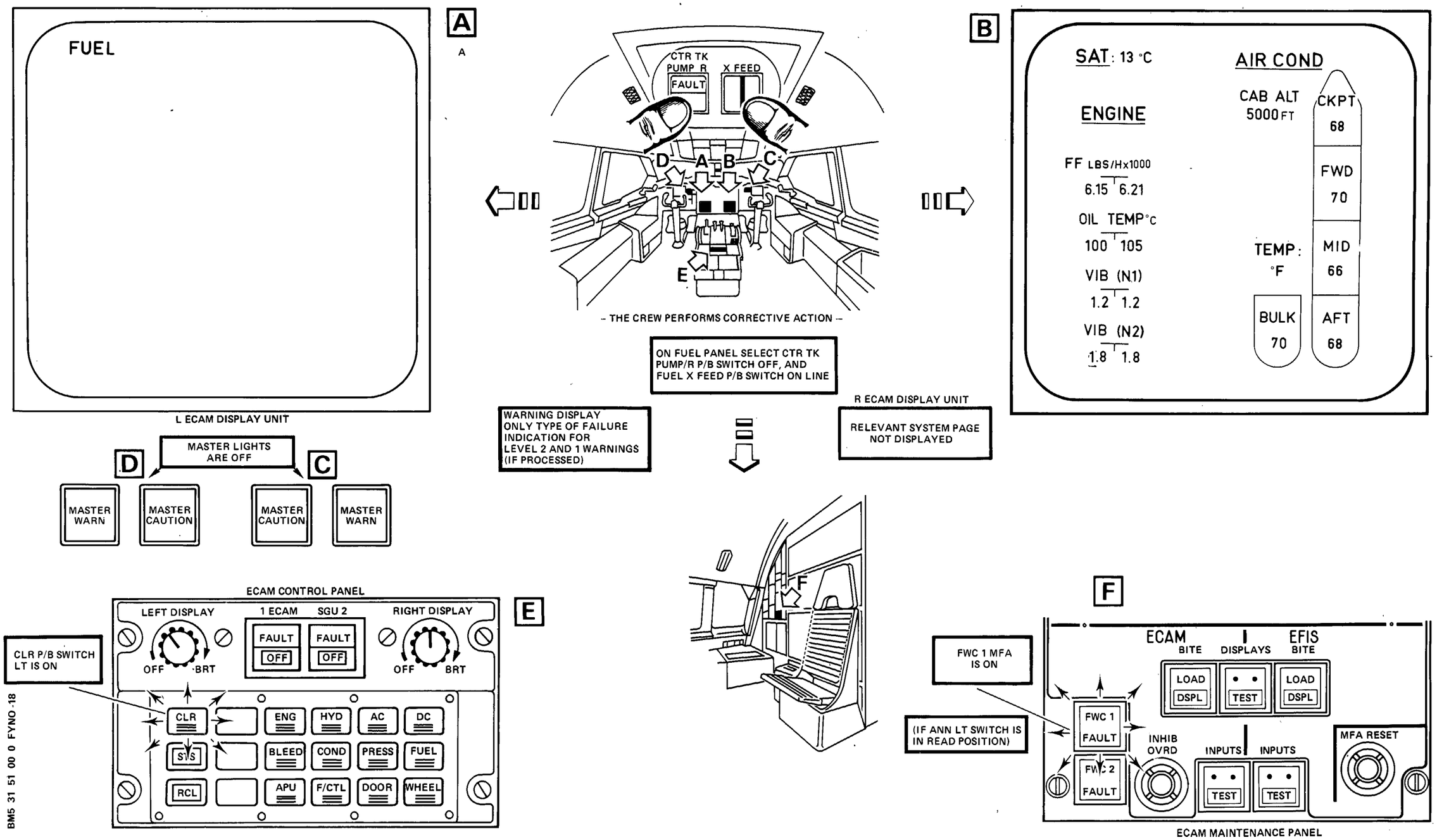


Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure - MASTER CAUTION Lights Extinguishing
Figure 066



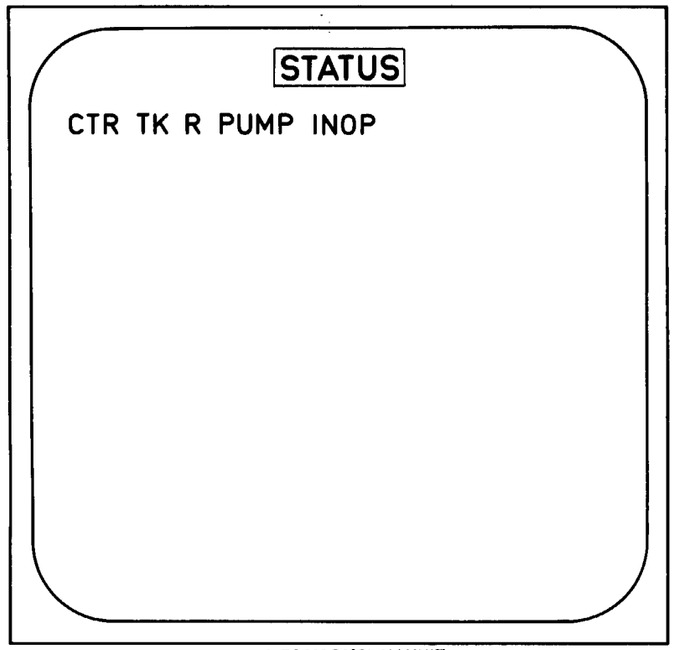
Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure
The Crew Performs Corrective Action (Procedure Indication on Paper)
Figure 067

EFFECTIVITY: 101-200,

R

PIA

Printed in France



L ECAM DISPLAY UNIT

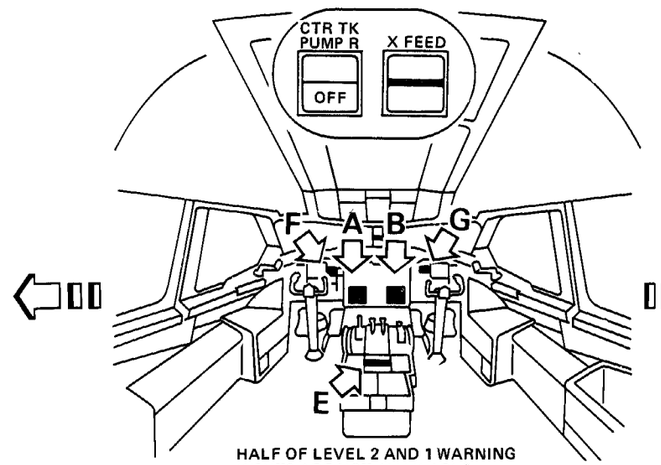
A

G

A

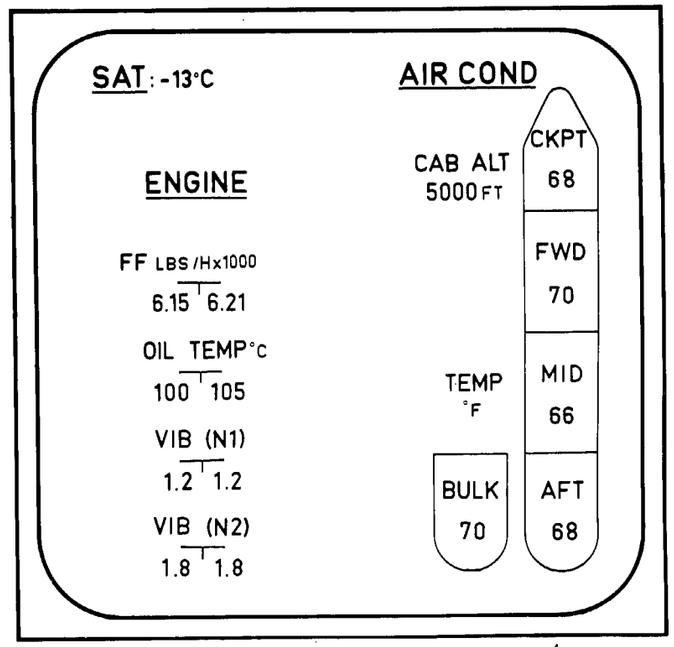
WARNING DISPLAY STATUS PAGE

(STATUS IF PROCESSED)



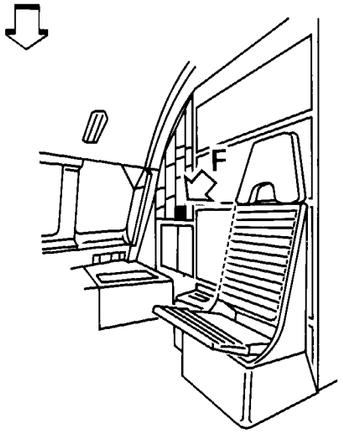
HALF OF LEVEL 2 AND 1 WARNING INPUTS ARE NOT AVAILABLE

B



R ECAM DISPLAY UNIT

SYSTEM DISPLAY PAGE RELATED TO THE FLIGHT PHASE



D

MASTER LIGHTS ARE OFF

C

MASTER WARN

MASTER CAUTION

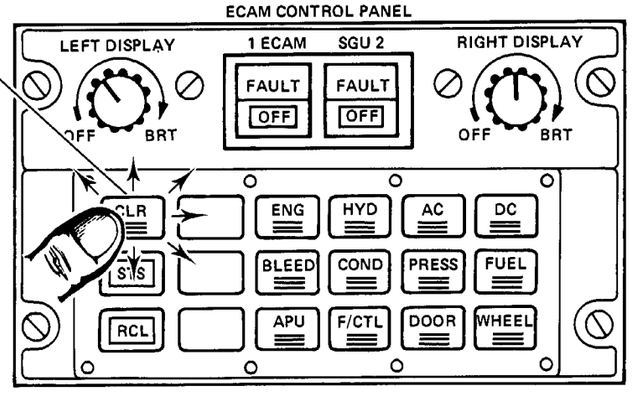
MASTER CAUTION

MASTER WARN

ECAM CONTROL PANEL

PRESS THE CLR P/B SWITCH, CLR LIGHT REMAINS ON

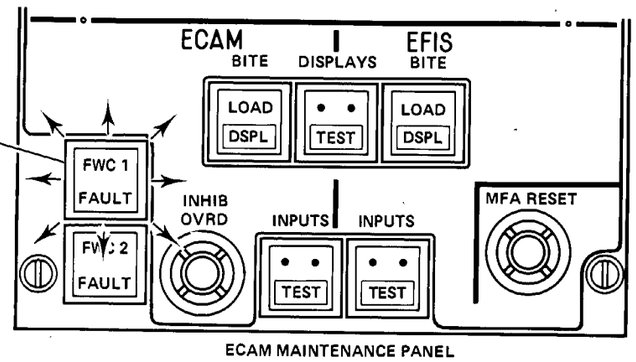
E



FWC1 MFA IS ON

(IF ANN LT SWITCH IS IN READ POSITION)

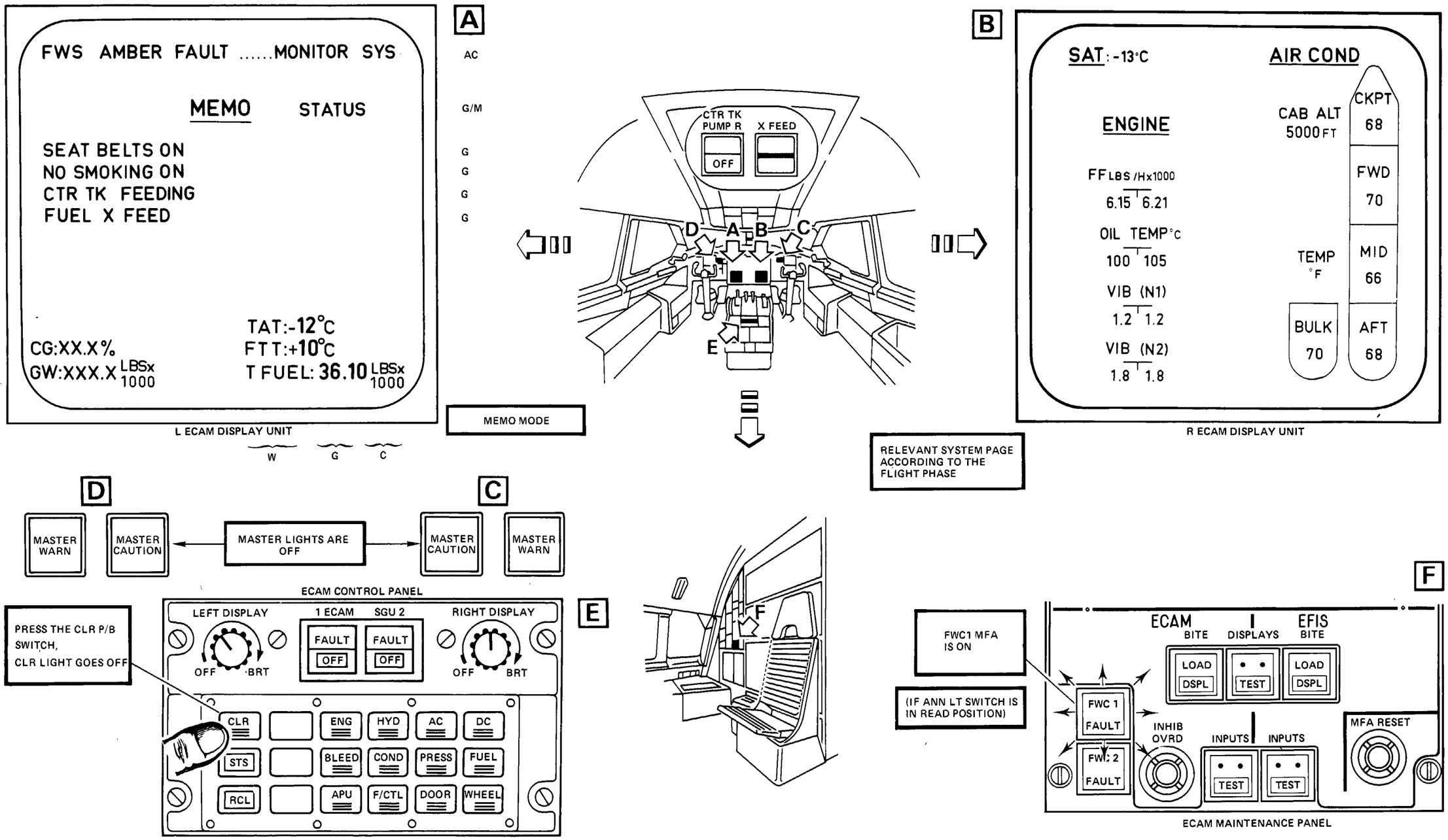
F



ECAM MAINTENANCE PANEL

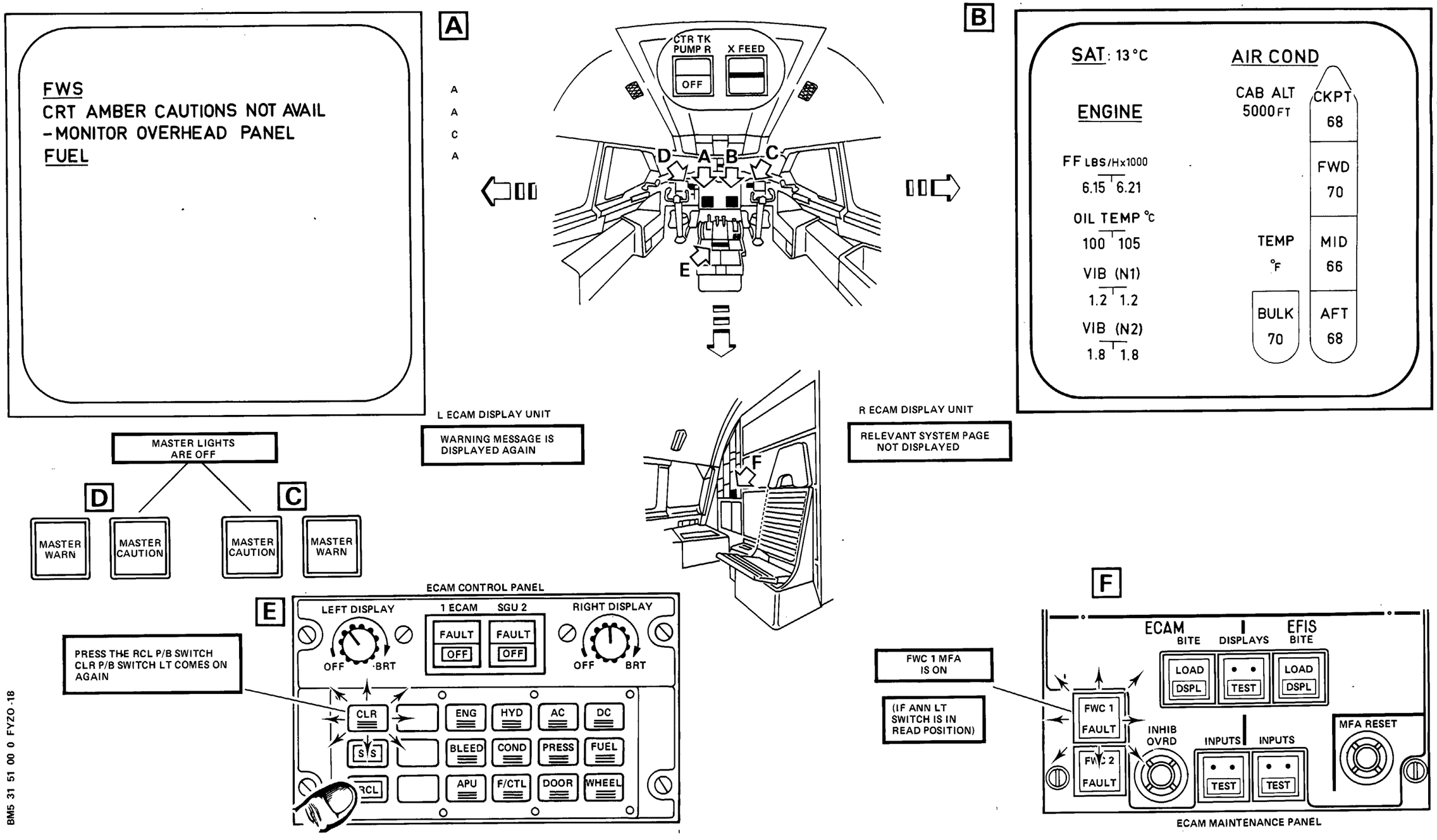
BM5 31 51 00 0 FYRO 18

Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure - Clearing of the Independent Failure
Figure 068



BM5 31 51 00 0 FYV0 -22

Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure - Clearing of the Status Information
Figure 069



Operation with an FWC Failure (FWC1) - Center Tank R Pump Failure - Playback of the Failure Sequence
Figure 070

Level 3 warnings are still processed by the FWC available and presented by the ECAM system.
Half of level 2 and 1 warning inputs are no longer available and the warnings processed lead to a type of failure indication on the L ECAM display unit (Ref. Fig. 015). If processed, status information is presented by the ECAM system.
In this case the systems have to be monitored on the R ECAM display unit and on the overhead and other control panels.
When the FWC failure occurs the MASTER CAUTION lights come on and the L ECAM display unit presents the message :
CRT AMBER CAUTIONS NOT AVAIL
- MONITOR OVERHEAD PANEL
When the warning message is cleared, the L ECAM display unit permanently displays the message FWS AMBER FAULT ... MONITOR SYS at the top of the MEMO page, just above the MEMO title.

B. FWC1 and FWC2 Audio Module Failure
In this case, no aural warnings are available. The L ECAM display unit presents the message : AURAL WARN NOT AVAIL. When this message is cleared by any CLR P/B switch, the L ECAM display unit permanently displays the message FWS AURAL FAULT at the top of the MEMO page, just above the MEMO title.
NOTE : In case of both FWCs failure, the following message appears on the L ECAM display unit above the MEMO title :
FWS FAULT.....MONITOR SYS

C. SGU 1 or 2 Failure
(Ref. Fig. 071)
The FAULT legend of the corresponding SGU P/B switch comes on on the ECAM control panel and a diagonal line appears on the concerned side display unit.
When the faulty SGU is switched off, all the functions are available and presented with no change to the crew.

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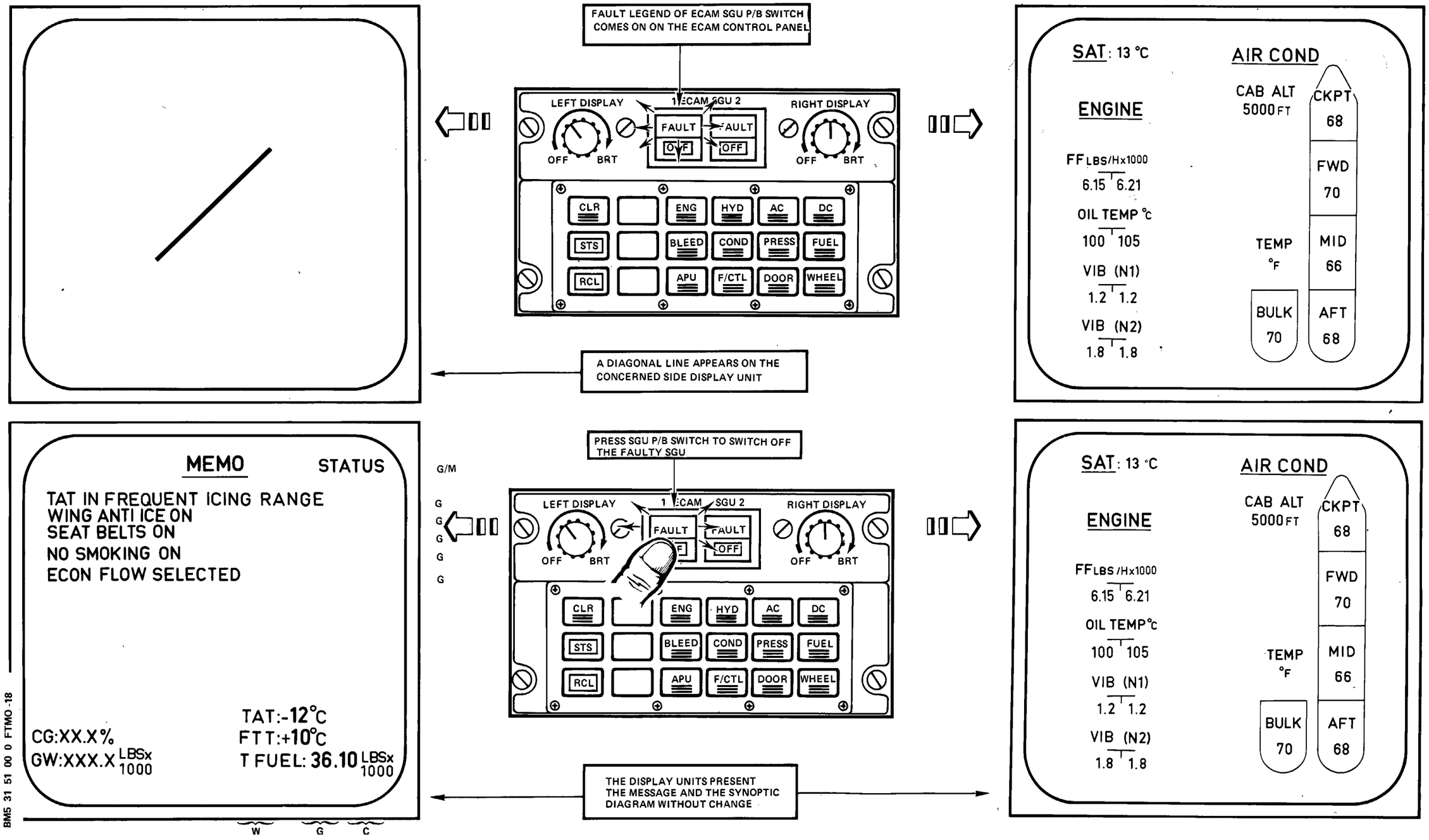


SGU 1 or 2 Failure
Figure 071

D. SDAC Failure

The MEMO mode, the system display function and most of the action feedback in the procedure messages are no more available. Some STATUS messages are also lost.

(1)Without aircraft system failure

(Ref. Fig. 072)

SYSTEM DATA NOT AVAILABLE is written in amber in the center of the L and R ECAM display units. Furthermore FUEL QTY AVAIL ... FUEL PAGE is displayed on R ECAM display unit.

(2)With an aircraft system failure

NO ACTION FEED BACK AVAILABLE is written in amber at the top of the L ECAM display unit.

SYSTEM DATA NOT AVAILABLE is written in amber on the R ECAM display unit.

E. Failure of One Display Unit

(Ref. Fig. 073)

When the display unit picture becomes uncomfortable or disappears, the display unit has to be switched off.

The display unit remaining in operation provides the crew with all the functions available to the both display units in a sequential manner.

(1)Without aircraft system failure, the available display unit presents the function normally displayed on the R display unit with the exception of the flight phase related page which is replaced by the MEMO page.

(2)With an aircraft system failure, the available display unit presents the warning and indicating messages.

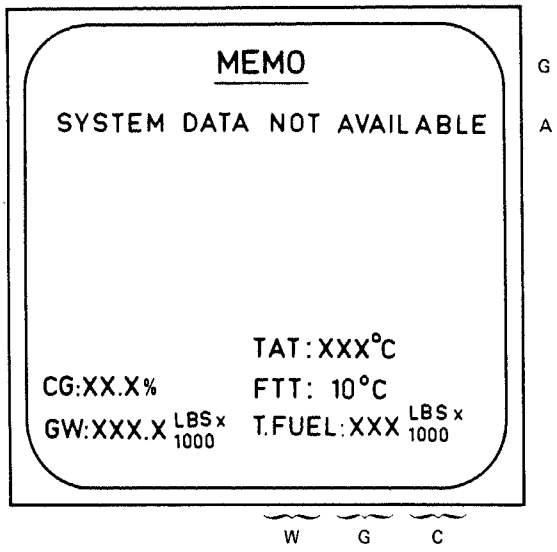
As for the affected system page, access is then limited to manual selection but only when the warning message is cleared.

F. Failure of Both Display Units

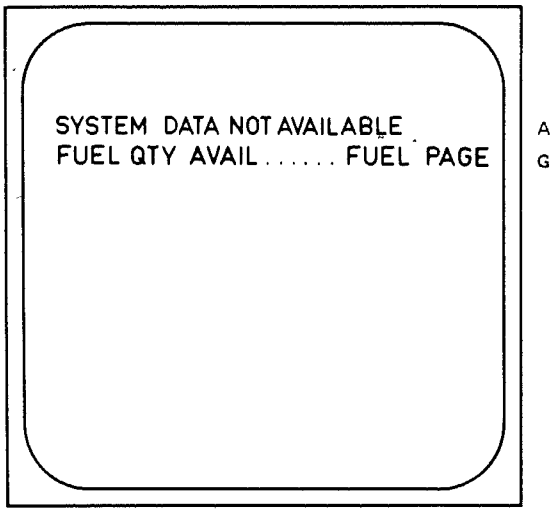
(Ref. Fig. 074)

- WITHOUT AIRCRAFT SYSTEM FAILURE

L ECAM DISPLAY UNIT
PRESENTS THE MESSAGE

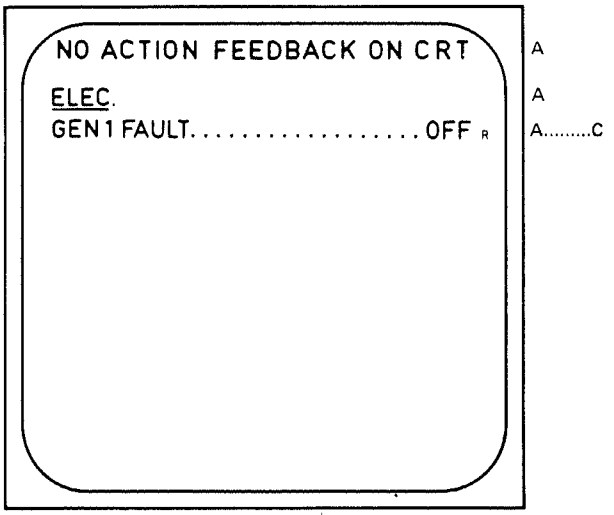


R ECAM DISPLAY UNIT
PRESENTS THE MESSAGE

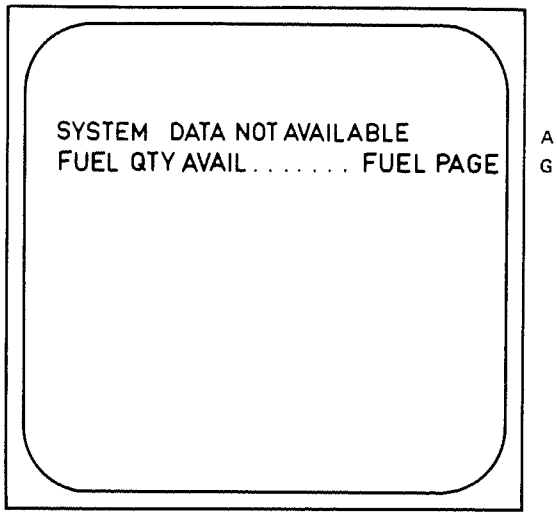


2 - WITH AN AIRCRAFT SYSTEM FAILURE

L ECAM DISPLAY UNIT
PRESENTS THE MESSAGE

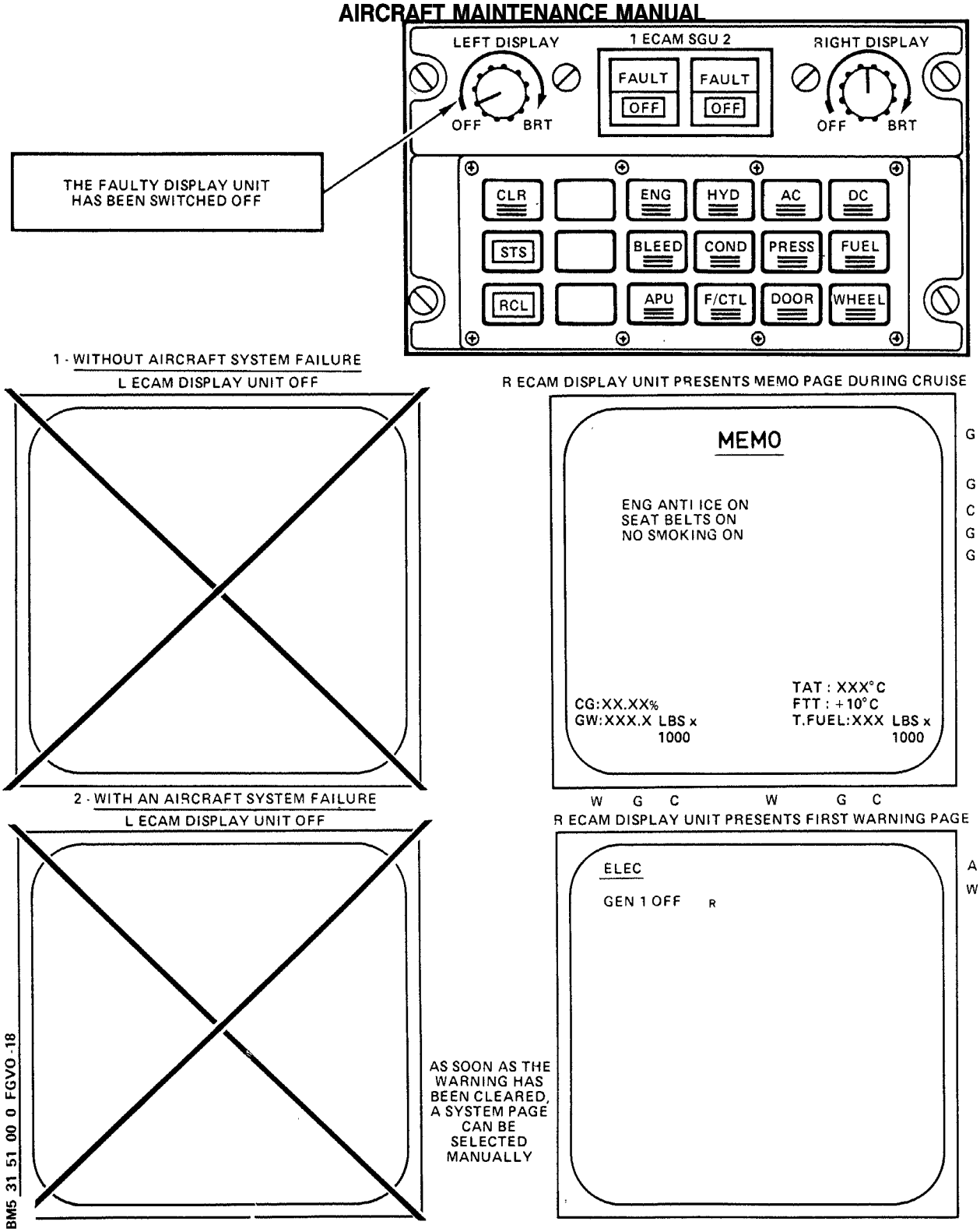


R ECAM DISPLAY UNIT
PRESENTS THE MESSAGE

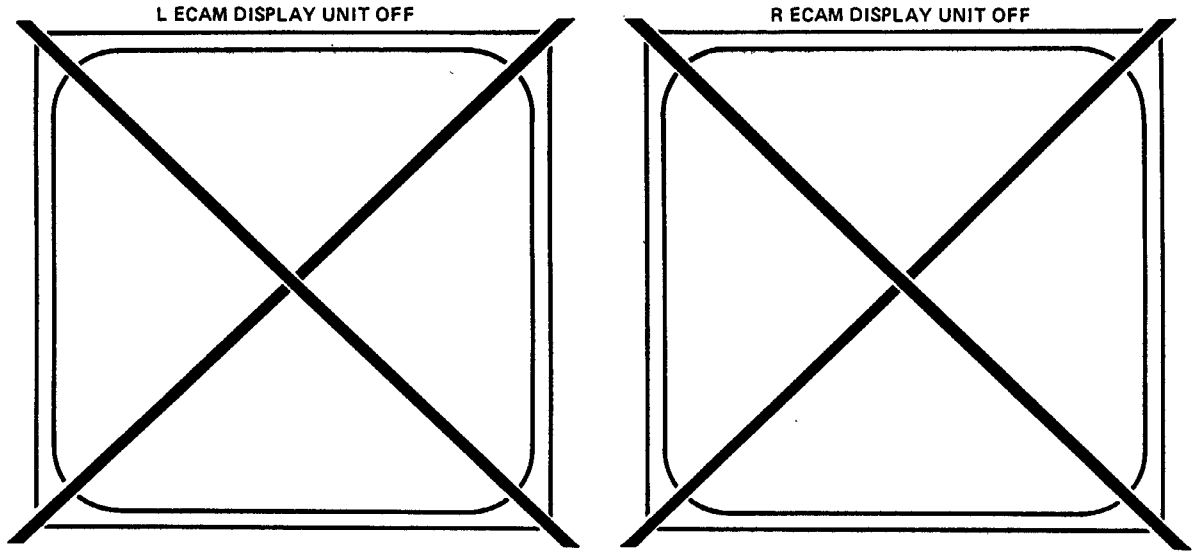


BM5 31 51 00 0 FQPO 18

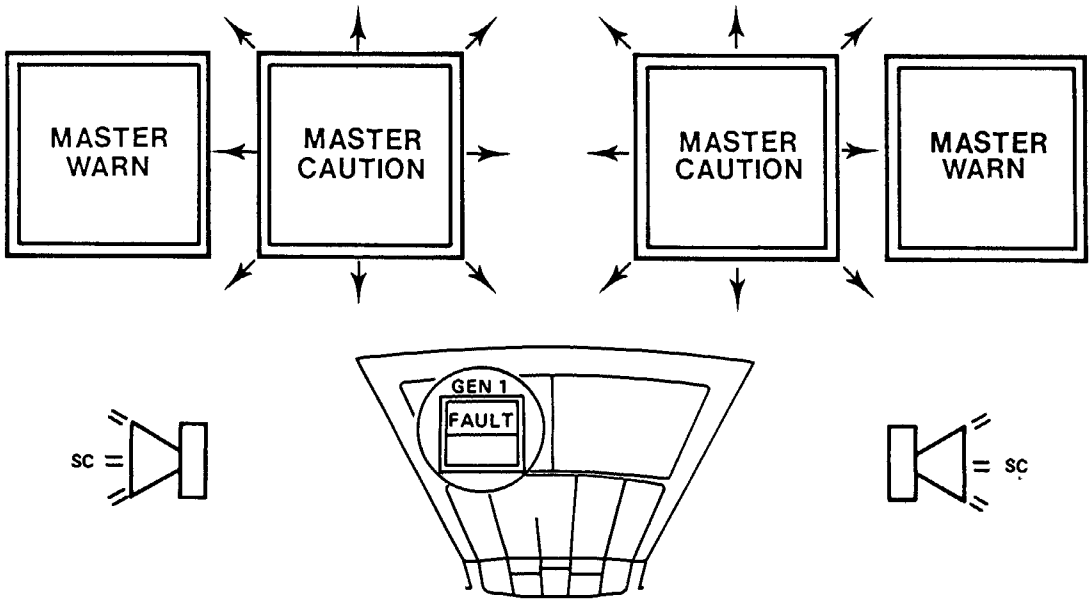
SDAC Failure
Figure 072



Failure of one Display Unit
Figure 073



IN THAT CASE A DETECTION AND A FIRST FAILURE DIAGNOSIS ARE PROVIDED
BY MASTER LIGHTS (LEVEL 3 AND 2 WARNINGS)
AURAL WARNINGS (LEVEL 3 AND 2), AND LIGHTS ON CONTROL PANELS



BM5 31 51 00 0 TAZO 14 09
DM5

Failure of Both Display Units and GEN1 Failure
Figure 074

8. Test Function

Two self tests are provided - Each is associated with a particular program.

A. Automatic Self Test

Each computer is equipped with a monitoring module which automatically checks as soon as the power supply is applied :

- the acquisition module
- the processing module
- the output module
- the memories
- the internal power supply

A power-on routine test checks for correct operation of the symbol generator units.

During this test, no picture is displayed on the ECAM display units.

A FWC failure causes the corresponding FWC FAULT to come on the ECAM maintenance panel, provided that the ANN MFA LT switch on panel (472VU) is placed in READ position (Ref. Fig. 010).

A SGU failure causes the FAULT legend of the corresponding P/B switch to come on on the ECAM control panel (Ref. Fig. 008).

B. Manual Self Test

This test is performed from the ECAM maintenance panel

(1)Inputs test

(Ref. Fig. 075)

(Ref. Fig. 076)

Pressing the INPUTS P/B switch on the ECAM maintenance panel causes TEST legend to come on. Most of the FWCs inputs are checked for continuity and the wrong inputs if any, appear in coded form on the L ECAM display unit. The R ECAM display unit presents the list of SDAC defective parameters (if any).

Both ECAM display units indicate in read out display form the BUS 429 failures.

On the ECAM control panel, press the twelve system P/B switches successively.

Each time a system P/B switch is pressed, the corresponding system synoptic diagram appears on the R ECAM display unit with the mention TEST written beside the title.

The synoptic diagram is shown with calibrated outputs from the SDAC. The defective parameters are presented with flag indication.

(2)Displays test

(Ref. Fig. 077)

Pressing the DISPLAYS P/B switch on the ECAM maintenance panel causes TEST legend to come on. This test checks for correct operation of the SGUs and the optical qualities of the ECAM display units through the display of a test pattern.

(3)BITE test

(Ref. Fig. 078)

The SGUs and FWCs have a non volatile RAM memory in which it is possible to write failure events occurring in the SGUs, FWCs, Display Units or input buses during five flight legs.

SGUs and FWCs internal failures are memorized during all the flight phases. The other failures are only memorized on ground above 70 kts and in flight. The LOAD legend of the ECAM/BITE P/B switch comes on each time one internal failure is written into the BITE memories of one SGU or one FWC during the present flight leg provided that the ANN LT switch is placed in READ position.

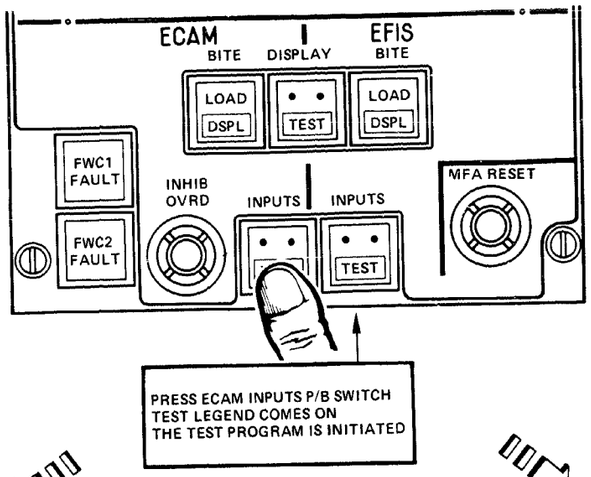
On ground, pressing the P/B switch will initiate the writing of the BITE memory contents on the DUs as follows :

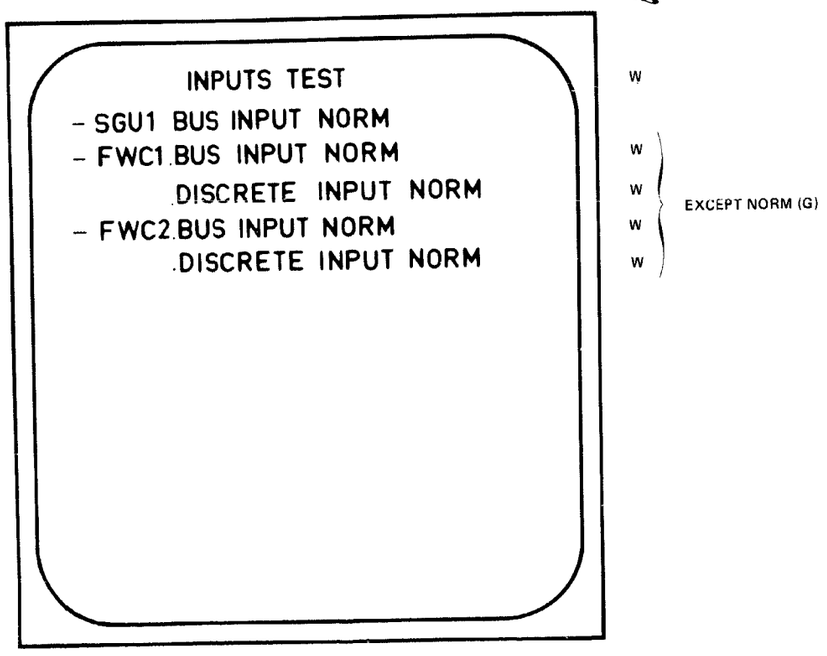
System 1 : left display unit

System 2 : right display unit.

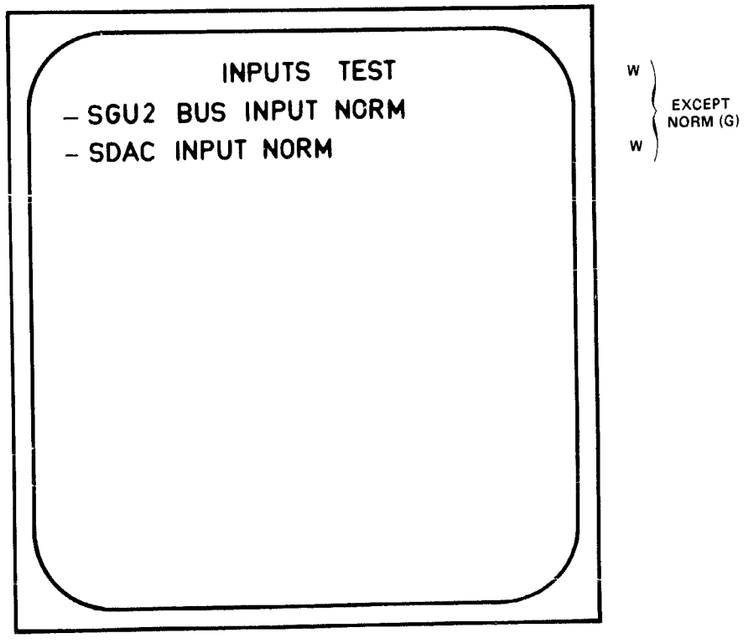
The upper section of the display gives information about the present flight leg in clear language.

The lower section of the display gives information about the present flight leg and the four previous ones in coded form.





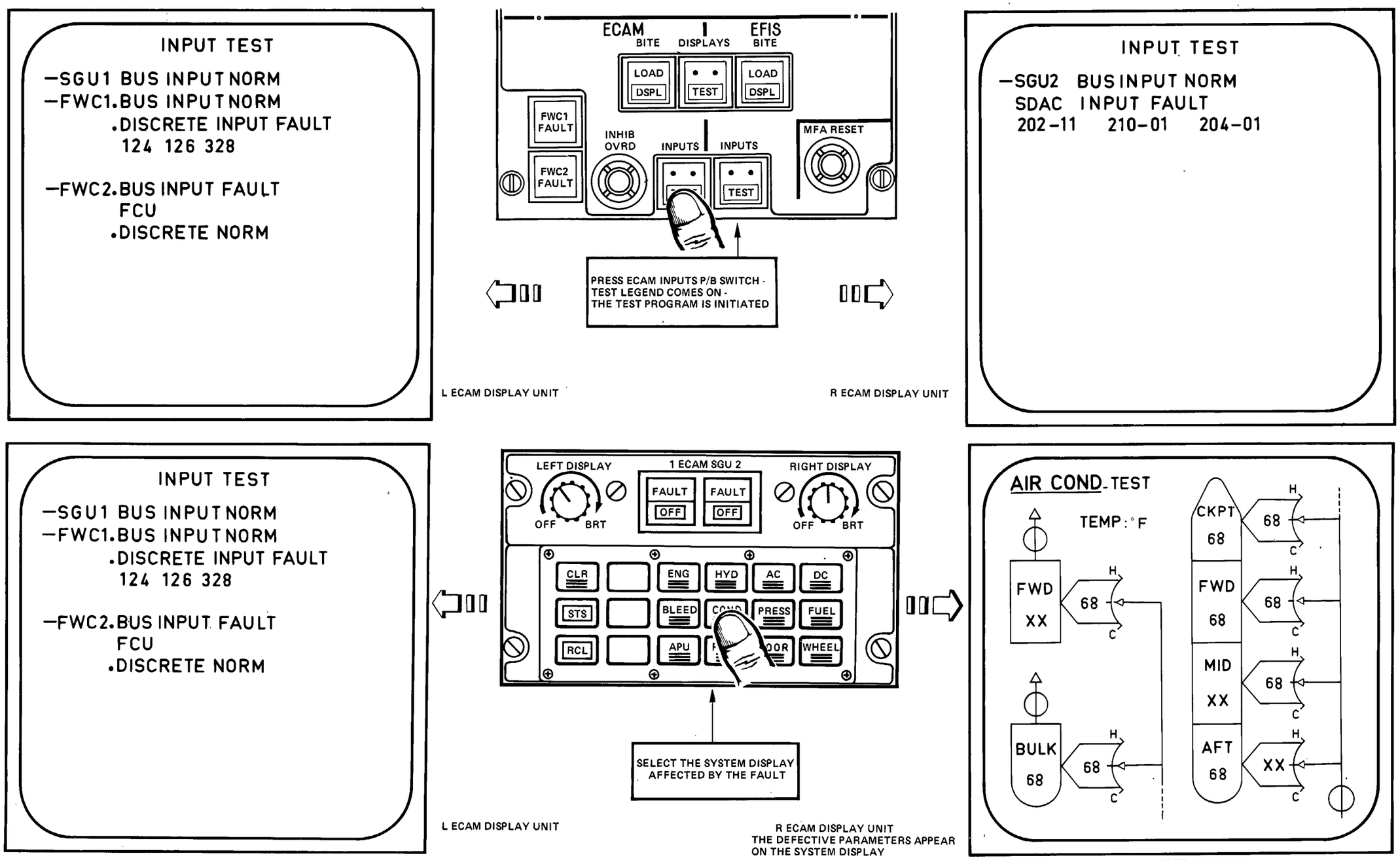
LEFT ECAM DISPLAY UNIT



RIGHT ECAM DISPLAY UNIT

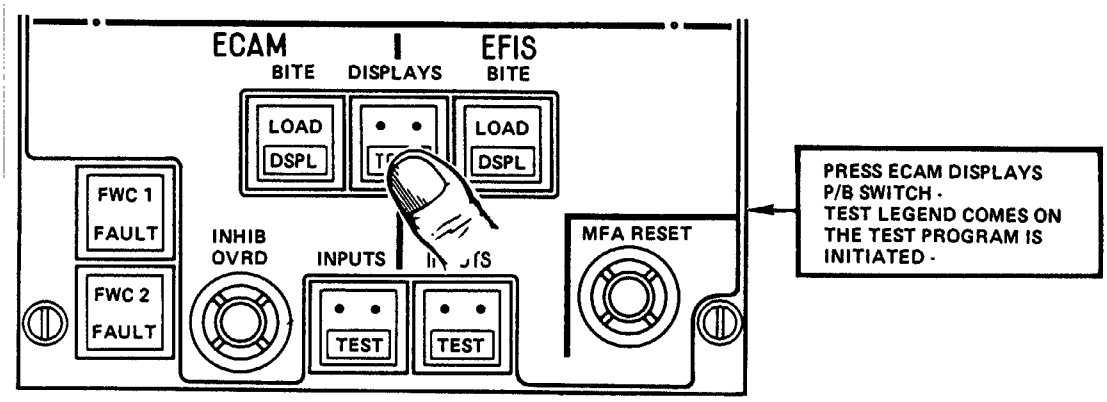
BM5 31 51 00 0 TBCO 14 09
DM5

Input Test without Aircraft System Failure
Figure 075

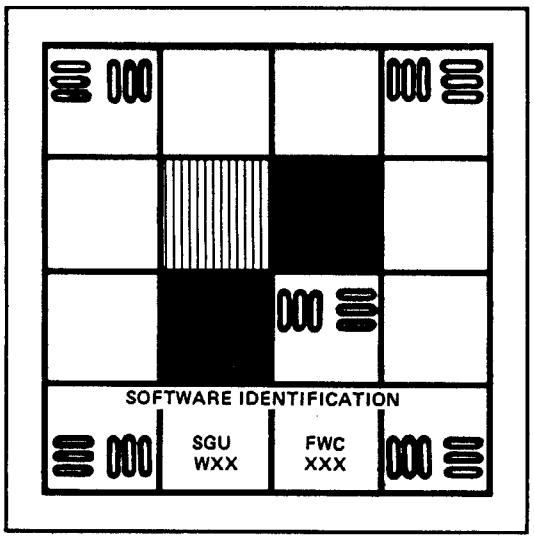


BM5 31 51 00 0 FBFO 18

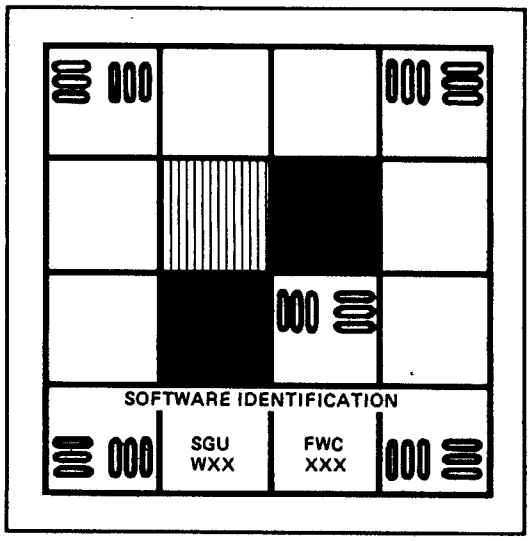
Input Test with Aircraft Failure
Figure 076



L ECAM DISPLAY UNIT



R ECAM DISPLAY UNIT



BM5 31 51 00 0 TBJO 14 09
DM5

Display Test
Figure 077

INTENTIONALLY BLANK

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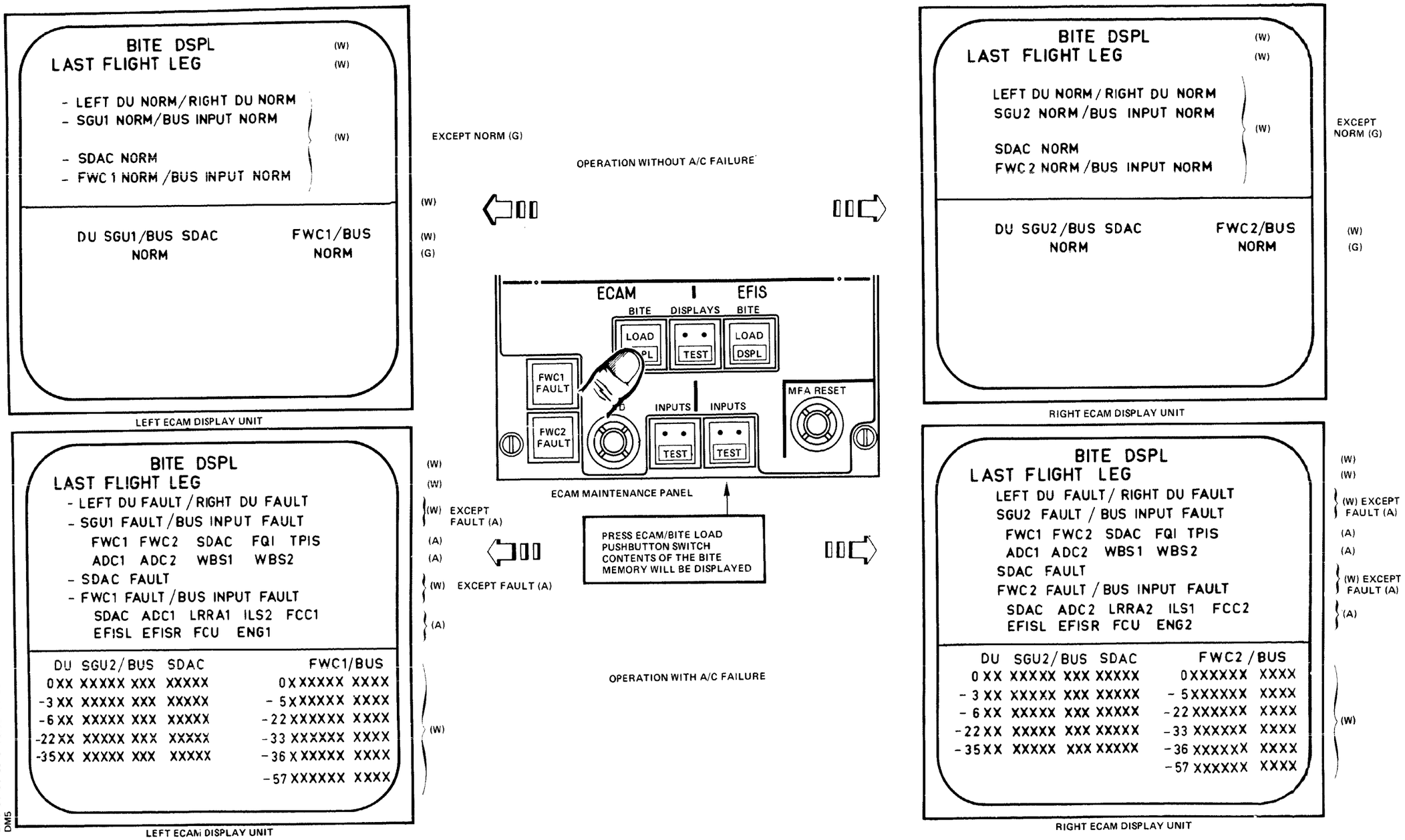

BITE DSPL (W)
LAST FLIGHT LEG (W)
- LEFT DU NORM/RIGHT DU NORM
- SGU1 NORM/BUS INPUT NORM (W)
- SDAC NORM
- FWC 1 NORM /BUS INPUT NORM
DU SGU1/BUS SDAC NORM (W)
FWC1/BUS NORM (G)
EXCEPT NORM (G)
LEFT ECAM DISPLAY UNIT
OPERATION WITHOUT A/C FAILURE
BITE DSPL (W)
LAST FLIGHT LEG (W)
LEFT DU NORM / RIGHT DU NORM
SGU2 NORM /BUS INPUT NORM (W)
SDAC NORM
FWC2 NORM /BUS INPUT NORM
DU SGU2/BUS SDAC NORM (W)
FWC2/BUS NORM (G)
EXCEPT NORM (G)
RIGHT ECAM DISPLAY UNIT
ECAM
EFIS
BITE
DISPLAYS
BITE
LOAD
TEST
LOAD
DSPL
FWC1 FAULT
FWC2 FAULT
INPUTS
INPUTS
TEST
TEST
MFA RESET
ECAM MAINTENANCE PANEL
PRESS ECAM/BITE LOAD PUSHBUTTON SWITCH CONTENTS OF THE BITE MEMORY WILL BE DISPLAYED
BITE DSPL (W)
LAST FLIGHT LEG (W)
- LEFT DU FAULT / RIGHT DU FAULT
- SGU1 FAULT /BUS INPUT FAULT (W) EXCEPT FAULT (A)
FWC1 FWC2 SDAC FQI TPIS (A)
ADC1 ADC2 WBS1 WBS2 (A)
- SDAC FAULT
- FWC1 FAULT /BUS INPUT FAULT (W) EXCEPT FAULT (A)
SDAC ADC1 LRRA1 ILS2 FCC1 (A)
EFISL EFISR FCU ENG1
DU SGU2/BUS SDAC FWC1/BUS
0XX XXXXX XXX XXXXX 0XXXXXX XXXX
-3XX XXXXX XXX XXXXX -5XXXXXX XXXX
-6XX XXXXX XXX XXXXX -22XXXXXX XXXX
-22XX XXXXX XXX XXXXX -33XXXXXX XXXX
-35XX XXXXX XXX XXXXX -36XXXXXX XXXX
-57XXXXXX XXXX (W)
LEFT ECAM DISPLAY UNIT
BITE DSPL (W)
LAST FLIGHT LEG (W)
LEFT DU FAULT/ RIGHT DU FAULT
SGU2 FAULT / BUS INPUT FAULT (W) EXCEPT FAULT (A)
FWC1 FWC2 SDAC FQI TPIS (A)
ADC1 ADC2 WBS1 WBS2 (A)
SDAC FAULT
FWC2 FAULT / BUS INPUT FAULT (W) EXCEPT FAULT (A)
SDAC ADC2 LRRA2 ILS1 FCC2 (A)
EFISL EFISR FCU ENG2
DU SGU2/BUS SDAC FWC2/BUS
0XX XXXXX XXX XXXXX 0XXXXXX XXXX
-3XX XXXXX XXX XXXXX -5XXXXXX XXXX
-6XX XXXXX XXX XXXXX -22XXXXXX XXXX
-22XX XXXXX XXX XXXXX -33XXXXXX XXXX
-35XX XXXXX XXX XXXXX -36XXXXXX XXXX
-57XXXXXX XXXX (W)
RIGHT ECAM DISPLAY UNIT

BM5 31 51 00 0 TBNO 14 09
DM5

BITE Test
Figure 078

EFFECTIVITY: 101-200,

PIA

1. ECAM Start Procedure

A. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	A/C External Power Control

B. Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUIT UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Job set-up

(a)Make certain that the following circuit breakers are closed :

	PANEL	SERVICE	IDENT.	LOCATION
	21VU	ECAM/CTL PNL LT	12WT	108/B01
	21VU	ECAM/DISPLAY UNIT L	7WT	108/B02
	21VU	ECAM/DISPLAY UNIT R	8WT	108/B03
	21VU	ECAM/SGU 1	11WT1	108/B04
	21VU	ECAM/SGU 2	11WT2	108/B05
R	21VU	ECAM FLT WARN MONITOR	4WW	108/B06
	21VU	ECAM/FLT WARN MONITOR	24WW	108/B07
	21VU	ECAM/FWC 1	7WW	108/B08
	21VU	ECAM/SDAC/26VAC/NORM 1	3WV1	109/A02
	21VU	ECAM/SDAC/26VAC/NORM 2	3WV2	109/A03
	21VU	ECAM/SDAC/26VAC/ESS	5WV	109/A04
	21VU	ECAM/SDAC/PWR SUPPLY	6WV	109/A05
	21VU	ECAM/FWC 2	32WW	109/A08
	22VU	AUDIO SYS/CTL PNL/F/O	31RN	205/E20
	132VU	LIGHTING/INTEGRAL LT/MAIN PNL & GLARE SHLD	1LF	322/N76
	132VU	LIGHTING/INTEGRAL LT/C/B & OVHD & PED	3LF	322/N77

(b)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

(c)Make certain that electronics racks ventilation is correct.

(d)On center pedestal, on ECAM control panel, make certain that legends of ECAM SGU 1 & 2 P/B switches are off (pressed).

(e)On maintenance panel 47OVU, on ECAM part, make sure that FWC1 FAULT, FWC2 FAULT lights are off, and INPUTS TEST legend is off.

(2)Start-up of the ECAM displays units

ACTION	RESULT
On center pedestal, on ECAM control panel, using LEFT DISPLAY and RIGHT DISPLAY knobs, adjust	After a few seconds, the images come into view : - MEMO page is displayed on left

ACTION	RESULT
brightness on left and right display units.	ECAM display unit. - DOOR page is displayed on right ECAM display unit. - On ECAM control panel, the lights are off. - On glareshield, MASTER WARN and MASTER CAUTION lights are off.

NOTE : If the left display unit shows a warning and the right display unit a system page different from the DOOR page, perform the procedure described below.

(3)Procedure with a warning

NOTE : If it is not necessary to repair the system(s) immediately.

ACTION	RESULT
On ECAM control panel, press CLR pushbutton switch as many times as necessary until the warning disappears.	- On left ECAM display unit : . warning message goes out . MEMO page comes on. - On right ECAM display unit, DOOR page is displayed. - On glareshield, MASTER WARN and master CAUTION lights are off. - Aural warning stops. (If it was in operation).

R 2. ECAM Stop Procedure

R ACTION	RESULT
R On center pedestal, on ECAM control panel, using LEFT DISPLAY and RIGHT DISPLAY knobs, turn them to OFF positions.	On left and right ECAM display units, the screens are blank.

R NOTE : For long line stops (more than one hour), it is recommended to switch OFF the CRT's.

1. Operational Test

A. Flight Warning Computer Test
(1)Reason for the job
- To perform operational test of FWC1 and FWC2 (paragraph (3)(b)
- To check that visual and aural warnings are activated by one FWC (paragraph (3)(c))

(2)Equipment and materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(3)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Make certain that electronics racks ventilation is correct.

3 Close overhead panel circuit breakers, particularly those associated with ELEC & ECAM.

4 On center pedestal, on ECAM control panel
- using LEFT DISPLAY knob adjust brightness on left ECAM display unit.
- make certain that legends of ECAM SGU 1 & 2 P/B switches are off.

(b)Operational test of FWC1 and FWC2

ACTION	RESULT
1. On L overhead C/B panel 21VU, open FWC2 circuit breaker 32WW (line 109, A8)	A single chime is heard and on left ECAM display unit, FWS CRT AMBER CAUTION NOT AVAIL - MONITOR OVERHEAD PANEL is displayed. - The upper half of the MASTER CAUTION lights comes on.
2. On rear panel 133VU, open ELEC-AC BUS1 WARN RELAY circuit breaker 9XN (line 335/R78)	On CAPT and F/O main instrument panels 3VU and 5VU, the upper half of the MASTER CAUTION lights remains on. Check that single chime sounds.
3. On overhead C/B panel 21VU, close circuit breaker 32WW and open FWC1 circuit breaker 7WW (line 108,B8)	On left ECAM display unit, the previous message remains : FWS CRT AMBER CAUTION NOT AVAIL - MONITOR OVERHEAD PANEL - The lower half of the MASTER CAUTION lights comes on.
4. On C/B panel 133VU, close circuit breaker 9XN and open ELEC-AC BUS2 WARN RELAY circuit breaker 8XN (line 335/R83)	On panels 3VU and 5VU, the lower half of the MASTER CAUTION lights remains on. Check that single chime sounds.
5. On overhead C/B panel 21VU, close circuit breaker 7WW, and on C/B panel 133VU, close circuit breaker 8XN	On left ECAM display unit, information previously displayed is cleared. The MASTER CAUTION lights go off.

(c)Warning process test of one FWC

ACTION	RESULT
1. On overhead C/B panel 21VU, open FWC2 circuit breaker 32WW (line 109, A8)	
2. On maintenance panel 47OVU, press ADS/SYS1 and INHIB/OVRD pushbutton switches, then release the latter.	- check that continuous repetitive chime sounds. - OVERSPEED warning is displayed on left ECAM display unit.
3. On ECAM control panel, press CLR pushbutton switch as many times as necessary to call up MEMO page on left ECAM display unit. Check that continuous repetitive chime stops.	
4. Release ADS/SYS1 pushbutton switch.	
5. On overhead C/B panel 21VU, close circuit breaker 32WW and open FWC1 circuit breaker 7WW (line 108, B8). Wait for the computer to initialize (approx. 10 s).	
6. On maintenance panel 47OVU, press ADS/SYS2 and INHIB/OVRD pushbutton switches, then release the latter.	- Continuous repetitive chime sounds. - OVERSPEED warning is displayed on left ECAM display unit.
7. Press CLR pushbutton switch as many times as necessary to call up MEMO page. Check that continuous repetitive chime stops.	
8. Release ADS/SYS2 pushbutton switch.	
9. Close circuit breaker 7WW	- MEMO page is still present on left ECAM display unit. DOOR page is displayed on right ECAM display unit.

(d)Close-up

1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Restore system and aircraft to normal operating condition.

B. SDAC Test

(1)Equipment and materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(2)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Make certain that electronics rack ventilation is correct.

3 Close overhead panel circuit breakers, particularly those associated with ECAM.

(b)Test

ACTION	RESULT
1. In avionics compartment, on shelf 94VU, on SDAC face, press TEST pushbutton switch	Test is initiated : On SDAC face, the two annunciator lights (one green, the other red) are on for 1 second, then the red light goes off and the green light remains on for 30 seconds. Afterwards the green light goes off.
2. On ECAM control panel : - press ELEC system pushbutton switch	On right ECAM display unit, the relevant page is displayed. Check that information on ELEC PWR panel is in accordance with information displayed on ELEC system page.

(c)Close-up

1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Restore system and aircraft to normal operating condition.

C. Loudspeakers and WARNING SYS/NORM CANCEL Pushbutton Switch Test

(1)Reason for the job

To perform operational test of WARNING SYS/NORM CANCEL pushbutton switch

(2)Equipment and materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(3)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Make certain that electronics racks ventilation is correct.

3 Close overhead and maintenance panels circuit breakers, particularly those associated with ECAM, ELEC, HYD and ENG FIRE DET.

4 Make certain that hydraulic pumps are not operating.

(b)Test

ACTION	RESULT
On Engine 1 Fire control module 39WD (on overhead panel)	
1. Make certain that LOOP A and LOOP B pushbutton switches are pressed (In).	- OFF legends are off.
2. Press and hold LOOP TEST pushbutton switch.	On control module 39WD - LOOP A legend comes on.
After 2 second time delay :	On CAPT and F/O main instrument panels 3VU and 5VU - MASTER CAUTION lights come on Aural warning sounds (single chime). On the L ECAM display unit the following message appears LOOP - ENG1 LOOP A FAULT ... OFF.
After 1.5 second time delay :	Continuous repetitive chime sounds. - On 3VU and 5VU MASTER CAUTION lights go off MASTER WARN lights flash On the L ECAM display unit
R	ENG1 FIRE message appears.
3. On center pedestal, on panel 417VU Press WARNING SYSTEM/NORM CANCEL.	Continuous repetitive chime stops.

ACTION	RESULT
4. Release LOOP TEST pushbutton switch.	
5. Repeat step 2.	Same result as step 2.
6. On CAPT or F/O main instrument panels 3VU, 5VU, - press MASTER WARN.	Continuous repetitive chime stops.
7. Release LOOP TEST pushbutton switch.	

(c)Close-up
1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Restore system and aircraft to normal operating condition.

D. Loudspeakers and WARNING SYS/EMER CANCEL Pushbutton Switch Test

(1)Reason for the job
To perform operational test of WARNING SYS/EMER CANCEL pushbutton switch.

(2)Equipment and materials

ITEM	DESIGNATION
R A.	Snapwire
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(3)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(a)Job set-up
1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Make certain that electronics racks ventilation is correct.
3 Close overhead and maintenance panels circuit breakers particularly those associated with ECAM, ELEC, HYD and ENGINE FIRE DET.
4 Make certain that hydraulic pumps are not operating.
R 5 On panel 417VU, remove snapwire from WARNING SYS/EMER CANCEL
R pushbutton switch 16WW.

R (b)Test

ACTION	RESULT
On Engine 1 Fire control module 39WD (on overhead panel)	
1. Make certain that LOOP A and LOOP B pushbutton switches are pressed (In)	- OFF legends are off.
2. Press and hold LOOP TEST pushbutton	On control module 39WD

ACTION	RESULT
switch.	- LOOP A legend comes on.
After 2 second time delay :	On left ECAM display unit the following message appears - ENG1 LOOP A FAULT ... OFF. - Aural warning sounds. On CAPT and F/O main instrument panels 3VU and 5VU - MASTER CAUTION lights come on.
After 1.5 second time delay :	Continuous repetitive chime sounds : On left ECAM display unit the following message appears - ENG1 FIRE On 3VU and 5VU - MASTER CAUTION lights go off - MASTER WARN lights flash.
3. On center pedestal, on panel 417VU - press WARNING SYSTEM/EMERG CANCEL.	Continuous repetitive chime stops.
4. Release LOOP TEST pushbutton switch.	

(c)Close-up

R 1 On panel 417VU, safety WARNING SYS/EMER CANCEL pushbutton switch
R 16WW with snapwire.
R 2 De-energize the aircraft electrical network (Ref. 24-41-00,
R P. Block 301).
R 3 Restore system and aircraft to normal operating condition.

E. ECAM SGU Test

(1)Reason for the job

To perform operational test of SGU switching via ECAM SGU pushbutton switch.

(2)Equipment and materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(3)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Make certain that electronics rack ventilation is correct.
3 Close overhead panel circuit breakers, particularly those asso-

ciated with ECAM.
4 On center pedestal, on ECAM control panel
- using LEFT DISPLAY and RIGHT DISPLAY knobs, adjust brightness on left and right ECAM display units.
- make certain that legends of ECAM SGU 1 & 2 P/B switches are off.

(b)Test

ACTION	RESULT
1. On ECAM control panel - release ECAM SGU1 pushbutton switch	On ECAM control panel - OFF legend of ECAM SGU1 pushbutton switch comes on.
- press ECAM SGU1 pushbutton switch	- OFF legend goes off
2. On overhead C/B panel 21VU - open ECAM/SGU/1 circuit breaker 11WT1 (line 108, B/4)	On ECAM control panel - FAULT legend of ECAM SGU1 push-button switch comes on. A diagonal line appears on left ECAM display unit.
- close circuit breaker 11WT1	- FAULT legend goes off. - on left ECAM display unit, the following is displayed : - a warning message under a system title (ELEC-HYD-AIR etc.) or - a MEMO page under MEMO title.
3. On ECAM control panel : - select any page except DOOR	On ECAM control panel, the relevant pushbutton switch light comes on. On right ECAM display unit, the relevant system page is displayed.
- switch off SGU2 by releasing ECAM SGU2 pushbutton switch	On ECAM control panel, OFF legend of ECAM SGU2 pushbutton switch comes on. No change on right and left display units. Right DU displays system page selected on ECAM control panel and left DU displays : - a warning message if any - a MEMO page, if no other mode is selected.
- switch on SGU2	On ECAM control panel OFF legend of ECAM SGU2 pushbutton switch and relevant pushbutton switch light go off. No change on left display unit. - If a warning is displayed press CLR pushbutton switch until MEMO page appears on left display unit. On right display unit a diagonal

ACTION	RESULT
	line is displayed for a few seconds then replaced by the **DOOR** page.
- select any page except **DOOR**	On right display unit **DOOR** page is replaced by the selected page.
- switch off **SGU1**	No change on right and left display units.
- switch on **SGU1**	No change on right display unit. On left display unit a diagonal line is displayed for a few seconds, then replaced by - a warning message, if any - a **MEMO** page, if no other mode has been selected.
4. On overhead **C/B** panel **21VU** - open **ECAM/SGU/2** circuit breaker **11WT2** (line 108, B/5)	On **ECAM** control panel - **FAULT** legend of **ECAM SGU2** push-button switch comes on. A diagonal line appears on right **ECAM** display unit.
- close circuit breaker **11WT2**	**FAULT** legend goes off
5. On **ECAM** control panel set **LEFT (RIGHT) DISPLAY** knob to **OFF** position to switch off **LEFT (RIGHT)** display unit	**MEMO** page is displayed on the **RIGHT (LEFT)** display unit, except when an aircraft system failure occurs. In this case, a warning appears on the display unit (press **CLR** pushbutton switch)
6. Switch on **LEFT (RIGHT)** display unit, wait for a while and adjust brightness using **LEFT (RIGHT) DISPLAY** knob.	
7. Switch off **RIGHT (LEFT)** display unit and repeat steps 5 and 6.	Same displays as in steps 5 and 6.

(c)Close-up
1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Restore system and aircraft to normal operating condition.

F. BITE Memory Display Test

(1)Reason for the job

- this test enables failures (SGU, DU and some sensors inputs) occurring during a flight leg to be displayed on the ECAM display units. Reading the BITE memory is possible in line to help in complex failure situation.

(2)Equipment and materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(3)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Make certain that electronics rack ventilation is correct.

3 Close overhead panel circuit breakers, particularly those associated with ECAM.

4 On center pedestal, on ECAM control panel

- using LEFT DISPLAY and RIGHT DISPLAY knobs, adjust brightness on left and right ECAM display units.
- make certain that legends of ECAM SGU 1 & 2 P/B switches are off.

(b)Test

ACTION	RESULT
On maintenance panel 47OVU 1. press ECAM/BITE pushbutton switch	- DSPL legend of BITE pushbutton switch comes on. On left ECAM display unit, if no failure has been recorded, the following message is displayed : BITE DSPL LAST FLIGHT LEG - LEFT DU NORM/RIGHT DU NORM - SGU1 NORM/BUS INPUT NORM - SDAC NORM - FWC1 NORM/BUS INPUT NORM --- DU SGU1/BUS SDAC FWC1/BUS NORM NORM

ACTION	RESULT
	The message is written in white (including horizontal line) except NORM (Green) On right ECAM display unit, if no failure has been recorded, the following message is displayed : BITE DSPL LAST FLIGHT LEG - LEFT DU NORM/RIGHT DU NORM - SGU2 NORM/BUS INPUT NORM - SDAC NORM - FWC2 NORM/BUS INPUT NORM DU SGU2/BUS SDAC FWC2/BUS NORM NORM The message is written in white (including horizontal line) except NORM (Green)
2. Release ECAM/BITE pushbutton switch	On both display units, messages previously displayed are cleared. DSPL legend of BITE pushbutton switch goes off.

(c)Close-up
1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Restore system and aircraft to normal operating condition.

G. ECAM/EFIS Displays Test

(1)Reason for the job

- to check correct operation of symbol generator units and display units.

(2)Equipment and materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(3)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Make certain that electronics rack ventilation is correct.

3 Close overhead panel circuit breakers, particularly those associated with ECAM.

4 On center pedestal on ECAM control panel

- using LEFT DISPLAY and RIGHT DISPLAY knobs, adjust brightness on left and right ECAM display units.
- make certain that legends of ECAM SGU 1 & 2 P/B switches are off.

(b)Test

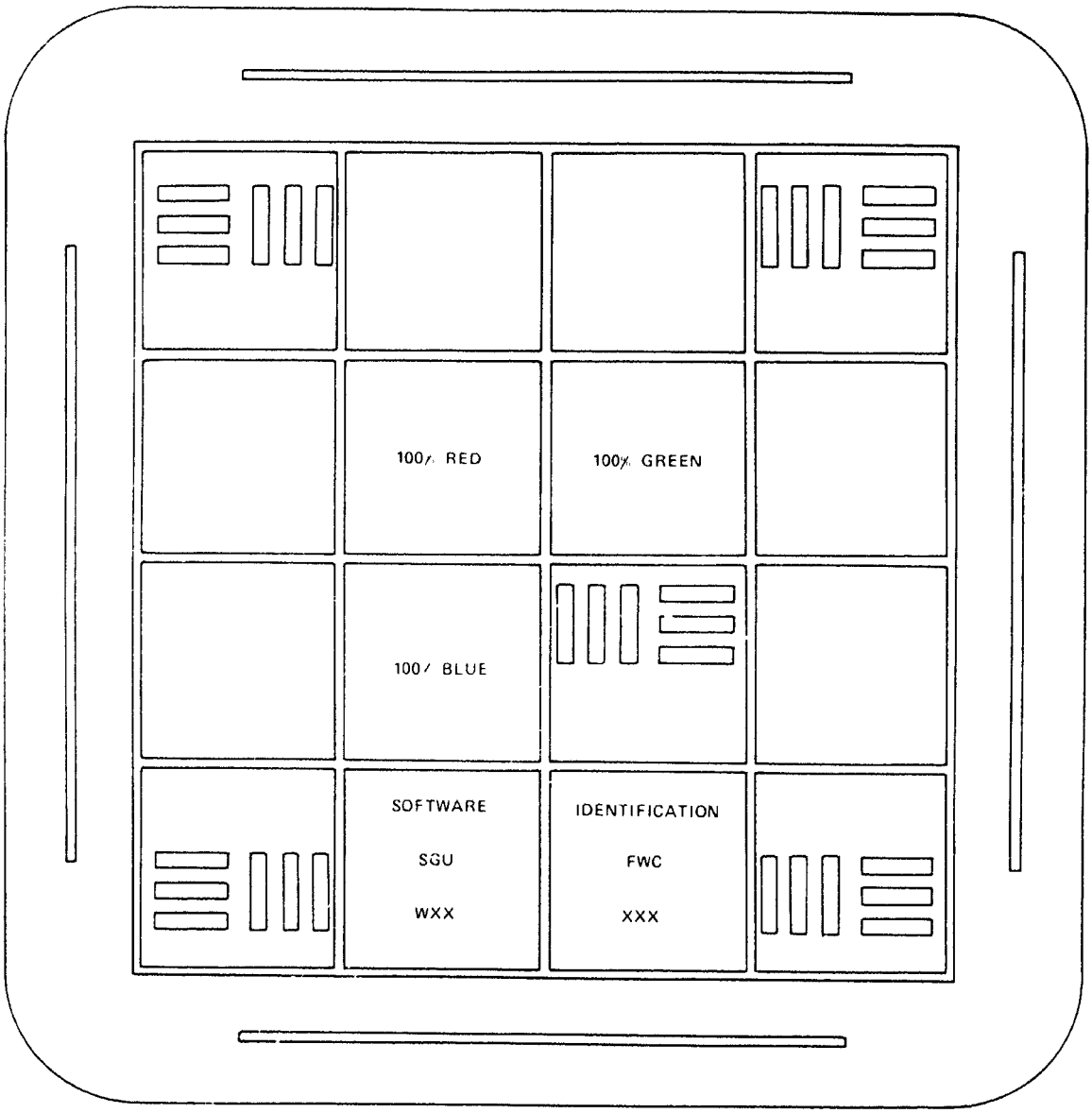
(Ref. Fig. 501)

ACTION	RESULT
1. On maintenance panel 47OVU	
- press ECAM/DISPLAYS pushbutton switch	- TEST legend comes on - the same typical test pattern is displayed on both ECAM display units and on the 4 EFIS display units after 2 or 3 s. In the meantime a diagonal line is displayed.
- release ECAM/DISPLAYS pushbutton switch	- on display units, pattern previously displayed is cleared.

(c)Close-up

1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Restore system and aircraft to normal operating condition.



BM5 31 51 00 5 TGM2 13 08
DM5

Test Pattern
Figure 501

H. INPUTS Test

(1)Reason for the job

- to check that all bus inputs and some discrete inputs are available.

(2)Equipment and materials

ITEM	DESIGNATION
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 33-14-00, P. Block 501	Annunciator Light Test

(3)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

2 Make certain that electronics rack ventilation is correct.

3 Close overhead panel circuit breakers, particularly those associated with ECAM.
- overhead panel : BRT/DIM/TEST switch in BRT position (panel 436VU).

4 On center pedestal, on ECAM control panel
- using LEFT DISPLAY and RIGHT DISPLAY knobs, adjust brightness on left and right ECAM display units.
- make certain that legends of ECAM SGU 1 & 2 P/B switches are off.

5 On overhead panel, make certain that PITCH TRIM 1 or 2 is engaged.

R 6 On FMS CDU, on INIT B page, enter 25% value in CG field and 100 t
R (or 220,750 lbs) value in ZFW field.

(b)Test

ACTION	RESULT
On overhead panel, on ANN LT section of panel 436VU, press AUTO TEST pushbutton switch.	- ON legend comes on. Automatic light test is initiated. - Check that all lights come on. - At the end of automatic light test ON legend goes off (Ref. 33-14-00, P. Block 501).
On maintenance panel 470VU 1. press ECAM/INPUTS pushbutton switch	- TEST legend comes on - on left ECAM display unit, the following message is displayed : INPUTS TEST - SGU1 BUS INPUT NORM - FWC1 . BUS INPUT NORM . DISCRETE INPUT NORM

ACTION	RESULT
	- FWC2 . BUS INPUT NORM . DISCRETE INPUT NORM The message is written in white except **NORM** (green) On right **ECAM** display unit, the following message is displayed : **INPUTS TEST** - SGU2 BUS INPUT NORM - SDAC INPUT NORM The message is written in white except Norm (Green)
2. On **ECAM** control panel press any system page pushbutton switch. R **NOTE** : On **CAB PRESS** system page, the green **VENT OVBD** indication is displayed for approx. 10 seconds and then is replaced by amber XX.	The system page is displayed with typical values.
3. release **ECAM/INPUTS** pushbutton switch	- **TEST** legend goes off - on both display units, messages previously displayed are cleared.

R **ON A/C 101-200,

R Post SB 33-2046 For A/C 101-200,

R ACTION	RESULT
R On maintenance panel 47OVU	
R 1. press **ECAM/INPUTS** pushbutton switch	- **TEST** legend comes on R - on left **ECAM** display unit, the following message is displayed :
R	**INPUTS TEST**
R	- SGU1 BUS INPUT NORM
R	- FWC1 . BUS INPUT NORM
R	. DISCRETE INPUT NORM

ACTION	RESULT
	- FWC2 . BUS INPUT NORM . DISCRETE INPUT NORM The message is written in white except NORM (green) On right ECAM display unit, the following message is displayed : INPUTS TEST - SGU2 BUS INPUT NORM - SDAC INPUT NORM The message is written in white except Norm (Green)
2. On ECAM control panel press any system page pushbutton switch. R NOTE : On CAB PRESS system page, the R green VENT OVBD indication is R displayed for approx. 10 seconds R and then is replaced by amber XX.	The system page is displayed with typical values.
3. release ECAM/INPUTS pushbutton switch	- TEST legend goes off - on both display units, messages previously displayed are cleared.

**ON A/C ALL

(c)Close-up
1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Restore system and aircraft to normal operating condition.

I. MFA Test
(1)Equipment and materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(2)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Make certain that electronics rack ventilation is correct.
3 Close overhead panel circuit breakers, particularly those associated with ECAM.

(b)Test

ACTION	RESULT
1. Place ANN LT switch 2WB (on 472VU) in READ position	- FWC1 FAULT or FWC2 FAULT MFA comes on according to the faulty item of equipment.
2. Record which item of equipment is faulty	
3. Press MFA RESET pushbutton switch 18WB (on 470VU)	- The 2 MFAs must go off
4. Place ANN LT switch in OFF position	

(c)Close-up

1 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Restore system and aircraft to normal operating condition.

J. T.O Config Test
(1)Reason for the job
To make certain that the T.O CONFIG TEST warning operates in the following configurations :
(a)THS Trimmable Horizontal Stabilizer : paragraph (3).(b).
(b)FLAPS & SLATS : paragraph (3).(c).
(c)SPEED BRAKE : paragraph (3).(d).
(d)BRAKES TEMP HI : paragraph (3).(e).
(e)PROBE HEAT OFF : paragraph (3).(f).
(f)DOOR NOT CLOSED : paragraph (3).(g).
(g)NORM FOR TAKE OFF and PARKING BRAKE ON : paragraph (3).(h).
(2)Equipment and Materials

ITEM	DESIGNATION
(1)	Warning Notice
(2)	Safety Barriers
Referenced Procedures	
- 24-11-00, P. Block 301	AC External Power Control
- 29-10-00, P. Block 301	Main Hydraulic Power - Pressurization/ Depressurization
- 29-21-00, P. Block 301	Green Auxilliary Power
- 29-23-00, P. Block 301	Yellow Auxiliary Power (Power Transfer Unit)

WARNING : CHECK THAT LANDING GEAR GROUND SAFETIES INCLUDING WHEEL CHOCKS ARE IN POSITION.
BEFORE APPLYING OR RELIEVING HYDRAULIC SYSTEM PRESSURE, MAKE CERTAIN THAT THE TRAVEL RANGES OF THE CONTROL SURFACES ARE CLEAR.
BEFORE PRESSURIZING HYDRAULIC SYSTEMS, CHECK THAT ALL CONTROLS ARE SET TO CORRESPOND WITH THE ACTUAL POSITION OF THE SERVICES THEY OPERATE.
BEFORE PROCEEDING WITH MAINTENANCE WORK ON OR NEAR MECHANICAL FLIGHT CONTROLS OR PRIMARY FLIGHT CONTROL SURFACES, LANDING GEARS, ASSOCIATED DOORS OR ANY MOVING COMPONENT, MAKE CERTAIN THAT GROUND SAFETIES AND/OR WARNING NOTICES ARE IN CORRECT POSITION TO PREVENT INADVERTMENT OPERATION OF CONTROLS.

(3)Procedure
(b)Job set-up
1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
Make certain that electronics racks ventilation is correct.
2 Pressurize Green and Yellow hydraulic systems either :
- using hydraulic ground power cart (Ref. 29-10-00, P. Block 301)
- or using Green auxilliary power (Ref. 29-21-00, P. Block 301), and Yellow auxiliary power (Ref. 29-23-00, P. Block 301).
3 On SERVO CTL section of panel 428VU
- make certain that G and Y pushbutton switches are pressed and legends off.
4 Make certain that circuit breakers on overhead panel are closed, particularly those associated with FAC1 and FAC2.
5 Make certain that SPEED BRAKE control lever is in RET position, ground

spoiler function not preselected.

6 On center pedestal, on **ECAM** control panel **11VU**
- using **LEFT DISPLAY** knob adjust brightness on left **ECAM** display unit.
- make certain that legends of **ECAM SGU 1 & 2 P/B** switches are off.

7 On **ECAM** control panel press **CLR** pushbutton switch as many times as necessary to call up **MEMO** page on left **ECAM** display unit.

8 On **ECAM** control panel
- press **F/CTL** pushbutton switch to display **FLT CTL** page on right **ECAM** display unit.
- press **CLR** pushbutton switch until legend goes off.

9 Place flap and slat control lever in 4th notch position and display warning notice.

10 Install safety barriers.

11 Close all doors and press **DOOR** pushbutton switch to display **DOOR** page on right **ECAM** display unit.
Check that all doors are closed on **DOOR** page.

12 Remove protective covers from pitot probes.

13 On **PROBE HEAT** section of panel **433VU** make certain that **CAPT, F/O** and **STBY** pushbutton switches are pressed (**OFF** legends are off).

(b)To CONFIG TEST of trimmable horizontal stabilizer

ACTION	RESULT
1. Operate pitch trim control wheel to set the THS to 3.5° ± 0.4° A/C nose up	THS deflects downwards by value displayed on trim control wheel indicator
2. On panel 417VU - press and hold TO CONFIG/TEST pushbutton switch	On CAPT and F/O main instrument panels 3VU and 5VU - MASTER WARN lights flash. - Repetitive chime is activated. On left ECAM display unit : - the following message appears : CONFIG : PITCH TRIM NOT IN TO RANGE On right ECAM display unit - FLT CTL page appears On STAB scale - bug reproduces THS deflection
3. On panel 417VU - release TO CONFIG/TEST pushbutton switch	- above warnings disappear
4. Operate pitch trim control wheel to bring THS to a 2.3° +0.2° -0.4° A/C nose down	THS deflects upwards by value displayed on trim wheel indicator
5. On panel 417VU - press and hold TO CONFIG/TEST pushbutton switch.	On CAPT and F/O main instrument panels 3VU and 5VU, MASTER WARN lights flash. - repetitive chime is activated. On left ECAM display unit - the following message appears CONFIG PITCH TRIM NOT IN TO RANGE On right ECAM display unit - FLT CTL page appears On STAB scale - bug reproduces THS deflection.
6. On panel 417VU - release TO CONFIG/TEST pushbutton switch	- above warnings disappear
7. Operate pitch trim control wheel to bring THS to zero	THS returns to zero

(c)T.O Config Test of FLAPS and SLATS

1 Job set-up

- Fully retract flaps end slats
- Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
133VU	FLT CTL/SLATS/26VAC/SYS 2	4CV	335/R64
133VU	FLT CTL/SLATS/26VAC/SYS 1	3CV	335/R65

Make certain that the following circuit breakers are closed :

PANEL	SERVICE	IDENT.	LOCATION
133VU	FLT CTL/SFCC/NORM SUPPLY/FLAPS/SYS 2	6CV	331/V61
133VU	FLT CTL/SFCC/NORM SUPPLY/FLAPS/SYS 1	5CV	332/U61
133VU	FLT CTL/KRUGER	45CV	333/T61
133VU	FLT CTL/SFCC/NORM SUPPLY/SLATS/SYS 1	7CV	333/T63
133VU	FLT CTL/SFCC/NORM SUPPLY/SLATS/SYS 2	8CV	333/T64
133VU	FLT CTL/FLAPS/SYS 2/26VAC	2CV	334/S62
133VU	FLT CTL/FLAPS & SLATS/POS/ECAM	2CN	334/S65
133VU	FLT CTL/FLAPS & SLATS/POS/IND	1CN	334/S66
133VU	FLT CTL/FLAPS/SYS 1/26VAC	1CV	335/R61
133VU	FLT CTL/SFCC/LAND RECOVERY/SUPPLY/ SLATS/SYS 1	9CV	335/R66
133VU	FLT CTL/SFCC/LAND RECOVERY/SUPPLY/ FLAPS/SYS 1	10CV	335/R67
133VU	FLT CTL/SLATS/WTB 2	14CV	336/Q64
133VU	FLT CTL/SLATS/WTB 1	13CV	336/Q65
133VU	FLT CTL/FLAPS/WTB 1	11CV	336/Q66
133VU	FLT CTL/FLAPS/WTB 2	12CV	336/Q67

- Make certain that pitch trim control wheel is within T.O configuration (Ref. 27-41-00, P. Block 501).

2 Test

ACTION	RESULT
1. Move slat/flap control lever on center pedestal to Flaps 40°	- Flaps extend to 40° - Slat/flap indicator moves to FLAPS 40.
2. On panel 417VU - press T.O CONFIG/TEST pushbutton switch and hold depressed.	Continuous repetitive chime sounds. On left ECAM display unit, the following message appears : CONFIG FLAPS NOT IN T.O CONFIG SLATS NOT IN T.O CONFIG
3. On panel 417VU - Release T.O CONFIG/TEST	Above warnings are cancelled.

ACTION	RESULT
pushbutton switch.	
4. Move slat/flap control lever to first notch position.	- Flaps retract to 0° position - Slat/flap indicator moves to FLAPS 0.
5. Open, safety and tag circuit breakers 1CV (location 335/R61) and 2CV (location 334/S62). Remove safety clips and tags and close circuit breakers 3CV (location 335/R65) and 4CV (location 335/R64).	
6. On panel 417VU - press T.O CONFIG/TEST pushbutton switch and hold depressed.	Continuous repetitive chime sounds. On left ECAM display unit, the following message appears : CONFIG : SLATS NOT IN T.O CONFIG.
7. On panel 417VU - Release T.O CONFIG/TEST pushbutton switch.	Above warnings are cancelled.
8. Move slat/flap control lever to SLATS 30°.	- Slats extend to° - Slat/flap indicator moves to SLATS 30.
9. On panel 417VU - Press T.O CONFIG/TEST pushbutton switch and hold depressed.	Continuous repetitive chime sounds. On left ECAM display unit, the following message appears : CONFIG : SLATS NOT IN T.O CONFIG.
10. On panel 417VU - Release T.O CONFIG/TEST pushbutton switch.	Above warnings are cancelled.
11. Move slat/flap control lever to second notch position.	- Slats retract to 15° position - Slat/flap indicator moves to SLATS 15° position.

3 Close-up
Remove safety clips and tags and close circuit breakers 1CV and 2CV.

(d)T.O CONFIG TEST of SPEED BRAKE

ACTION	RESULT
1. On center pedestal - move **SPEED BRAKE** control lever to 7th notch.	On Slat/Flap indicator - **SPD BRK** legend comes on.
2. On panel 417VU - press and hold **TO CONFIG TEST** pushbutton switch.	On **CAPT** and **F/O** main instrument panels 3VU and 5VU - **MASTER WARN** lights flash - Continuous repetitive chime sounds On left **ECAM** display unit the following message appears : **CONFIG** **SPD BRK NOT RETRACTED.**
3. On panel 417VU - release **TO CONFIG TEST** push-button switch.	All above warnings disappears.
4. On center pedestal - move **SPEED BRAKE** control lever to **RET** position.	On Slat/Flap indicator -**SPD BRK** legend goes off.

(e)T.O CONFIG TEST of BRAKE TEMP HI

1 Job set-up

On panel 4VU, make certain that landing gear control lever is in DOWN position and prohibit its operation by displaying a warning notice.

2 Test

ACTION	RESULT
1. On rear panel, on panel 471VU - press and hold BRK TEMP/TEST pusbutton switch.	- On main instrument panel, on panel 400VU, HOT legend comes on. - On left ECAM display unit, the following message is displayed : BRAKES - TEMP HI - BRK FAN..... ON -DELAY T.O. - On CAPT and F/O main instrument panels 3VU and 5VU, MASTER CAUTION lights come on. - Single chime sounds.
2. On panel 417VU - press and hold T.O CONFIG TEST pushbutton switch.	- On left ECAM display unit information previously displayed goes off and reappears. - On right ECAM display unit WHEEL page is replaced by DOOR page during a short time and reappears again. - On CAPT and F/O main instrument panels 3VU and 5VU, MASTER CAUTION lights go off and then come on again. - single chime sounds.

ACTION	RESULT
3. On panel 417VU - release T.O CONFIG TEST pushbutton switch	- No change.
4. On rear panel, on panel 471VU, - release BRK TEMP/TEST pushbutton switch.	- Displays disappear on left ECAM display unit. - On panel 400VU, HOT legend goes off.

(f)T.O CONFIG TEST of PROBE HEAT OFF

1 Job set-up

- Make certain that overhead and rear panel circuit breakers are closed, particularly those associated with ANTI-ICE.

2 Test

ACTION	RESULT
1. On PROBE HEAT section of panel 433VU - release CAPT, (F/O), (STBY) pushbutton switches, then on ECAM maintenance panel 470VU	- OFF legends of CAPT, (F/O), (STBY) pushbutton switches come on.
- press and release INHIB/OVRD pushbutton switch.	- Single chime sounds - On CAPT and F/O main instrument panels 3VU and 5VU MASTER CAUTION lights come on.
2. On pedestal panel 417VU - press WARNING SYS/NORM CANCEL pushbutton switch until sounds stop, then on ECAM control panel	- On left ECAM display unit, the following message is displayed ANTI ICE CAPT, (F/O), (STBY) PROBE HEAT OFF
- press CLR pushbutton switch as many times as necessary to display the adjacent ANTI-ICE message	
3. On panel 417VU - press and hold T.O CONFIG TEST pushbutton switch	- On left ECAM display unit information previously displayed goes off and reappears - single chime sounds.
4. Release T.O CONFIG TEST pushbutton switch.	No change.
5. On PROBE HEAT section of panel 433VU - press CAPT, (F/O), (STBY) pushbutton switches	- OFF legends of CAPT, (F/O), (STBY) pushbutton switches go off.
6. On ECAM control panel - press CLR pushbutton switch as many times as necessary to call-up MEMO page on left ECAM display unit.	- On right ECAM display unit the DOOR page is displayed.

(g)To CONFIG TEST of DOOR NOT CLOSED
WARNING : BEFORE DOOR OPENING, IF THERE IS NO ACCESS PLATFORM, INSTALL SAFETY STRAP AT DOOR.

ACTION	RESULT
1. Open L or R FWD cabin door	On right ECAM display unit DOOR NOT LOCKED symbol is shown in amber.
2. On ECAM maintenance panel 47OVU - press and release INHIB/OVRD pushbutton switch	- Single chime sounds - On CAPT and F/O main instrument panels 3VU and 5VU MASTER CAUTION lights come on.
3. On pedestal panel 417VU - press WARNING SYS/NORM CANCEL pushbutton switch until sound stops, then on ECAM control panel - press CLR pushbutton switch as many times as necessary to display the adjacent DOOR message	- On left ECAM display unit the following message is displayed DOOR L(R) FWD CABIN NOT CLOSED
4. On panel 417VU - press and hold T.O CONFIG TEST pushbutton switch	- On left ECAM display unit information previously displayed goes off and reappears - Single chime sounds. No change.
5. Release T.O CONFIG TEST pushbutton switch.	
6. Close L or R FWD cabin door	On right ECAM display unit DOOR LOCKED symbol appears in green.
7. On ECAM control panel - press CLR pushbutton switch as many times as necessary to call-up MEMO page.	

(h)To **CONFIG TEST OF NORM FOR TAKE-OFF** and **PARKING BRAKE ON**

1 Job set-up

Make certain that parking brake is released.

2 Test

ACTION	RESULT
1. On pedestal panel 417VU - press and hold **T.O CONFIG TEST** pushbutton switch	On left **ECAM** display unit the following message is displayed **CONFIG** **NORM FOR TAKE-OFF**
2. Release **T.O CONFIG TEST** pushbutton switch	On left **ECAM** display unit the message previously displayed goes off.
3. On center pedestal 9VU - place **PARKING BRAKE** control handle in **ON** position - place throttle control lever 1 or 2 in 22° position or higher.	- Continuous repetitive chime sounds - On **CAPT** and **F/O** main instrument panels **3VU** and **5VU** **MASTER WARN** lights flash **MASTER CAUTION** lights come on - On left **ECAM** display unit the following message is displayed **CONFIG** **PARKING BRAKE ON**
4. On panel 417VU - press **WARNING SYS/NORM CANCEL** pushbutton switch and then - press and hold **T.O CONFIG TEST** pushbutton switch	- No change.
5. On center pedestal 9VU, - place throttle control lever in idle position.	
6. On **ECAM** control panel - press **CLR** pushbutton switch as many times as necessary to display **MEMO** page.	**ON** left **ECAM** display unit **MEMO** page is displayed.

(i)Close-up

1 Shut down hydraulic power supply.
Depressurize systems where applicable, disconnect hydraulic ground power cart.

2 De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).

3 Remove warning notice and safety barriers.

4 Restore system and aircraft to normal operating condition.

K. Excess Aft CG Warning Test

(1)Reasons for the job

- To perform operational test of excess aft CG warning.

(2)Equipment and materials

ITEM	DESIGNATION
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 22-27-00, P. Block 501	TRIM Engage Logic

(3)Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT. MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

R WARNING : BEFORE TEST IS INITIATED, MAKE SURE THAT HYDRAULIC POWER IS
R PRESENT ON AIRCRAFT. IF IT IS, PLACE FLAP LEVER AT "0°"
R POSITION BECAUSE OF THE "FLAP RELIEF" FUNCTION.

(a)Job set-up

1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Make certain that electronics racks ventilation is correct.
3 Close overhead panel circuit breakers, particularly those associated with ADS, ECAM, CGCC, AFS.
4 On center pedestal, on ECAM control panel using LEFT DISPLAY knob adjust brightness on left ECAM display unit.
5 Make certain that legends of ECAM 1 & 2 pushbutton switches are off.
6 On maintenance panel place ANN LT switch in READ position.
- on 470VU check that FWC1 FAULT and FWC2 FAULT MFAs are off.
- on 472VU make certain that FAULT legend of CGCC annunciator is off.
7 On overhead panel 430VU check that FAULT legend of AUTO/MODE push-button switch is off.
8 On overhead panel, place PITCH TRIM 1 and 2 levers in ON position (Ref. 22-27-00, P. Block 501).

(b)Test

NOTE : The test described below concerns ADS system 1. For ADS system 2 test which is identical, refer to information between parentheses.

ACTION	RESULT
1. On ECAM control panel - press RCL pushbutton switch - then press CLR pushbutton switch as many times as necessary to call up MEMO page.	- On left ECAM display unit, MEMO page is displayed. - On right ECAM display unit, DOOR page is displayed. - On CAPT and F/O main instrument panels 3VU and 5VU, MASTER WARN and MASTER CAUTION lights are off. - Aural warning stops (if it was

ACTION	RESULT
	in operation).
2. By means of pitch trim control switch on CAPT (F/O) control wheel, place pitch trim control wheel at 1 deg. nose down side. On maintenance panel, press ADS SYS1 (SYS2) pushbutton switch.	On left ECAM display unit, message NAV - ADC 1 or 2 FAULT appears during a few seconds. Then VMO/MMO warning is displayed on left ECAM display unit. - Continuous repetitive chime is heard. - MASTER WARN lights flash. After at least one minute, on overhead panel 430VU, check that FAULT legend of AUTO/MODE pushbutton switch comes on. On left ECAM display unit, message FUEL - EXCESS AFT CG appears in red.
3. Move pitch trim control wheel to 0.5 deg. nose up side.	- FAULT legend of AUTO/MODE pushbutton switch goes off. On left ECAM display unit, message FUEL - EXCESS AFT CG disappears.
4. On maintenance panel, release ADS SYS1 (SYS2) pushbutton switch.	- Continuous repetitive chime stops. - MASTER WARN lights go off. On left ECAM display unit, MEMO page is displayed.
5. On overhead panel 21VU, open the FWC1 circuit breaker 7WW and FWC2 circuit breaker 32WW. After 10 seconds close FWC1 circuit breaker 7WW, and 3 seconds later close FWC2 circuit breaker 32WW. Wait a few seconds for FWC reset completion.	

(c)Close-up
- Restore system and aircraft to normal operating condition.
- De-energize the aircraft electrical network (Ref. 24-41-00,

P. Block 301).

**ON A/C 001-104,

Post SB 31-2113 For A/C 001-104,

K. Excess Aft CG Warning Test
(1)Reason for the job
To perform operational test of excess aft CG warning.
(2)Equipment and materials

ITEM	DESIGNATION
Referenced Procedures	
- 24-41-00, P. Block 301	AC External Power Control
- 22-27-00, P. Block 501	TRIM Engage Logic
- 12-11-28, P. Block 301	Replenishing of Fuel Tanks

(3)Procedure
WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT. MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.
WARNING : BEFORE TEST IS INITIATED, MAKE SURE THAT HYDRAULIC POWER IS PRESENT ON AIRCRAFT. IF IT IS, PLACE FLAP LEVER AT "0°" POSITION BECAUSE OF THE "FLAP RELIEF" FUNCTION.
(a)Job set-up
1 Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
2 Make certain that electronics racks ventilation is correct.
3 Close overhead panel circuit breakers, particularly those associated with ADS, ECAM, CGCC, AFS.
4 On center pedestal, on ECAM control panel, use LEFT DISPLAY knob to adjust brightness on left ECAM display unit.
5 Make certain that legends of ECAM 1 & 2 pushbutton switches are off.
6 On maintenance panel, place ANN LT switch in READ position.
- on panel 470VU, check that FWC1 FAULT and FWC2 FAULT MFAs are off.
- on panel 472VU, make certain that FAULT legend of CGCC annunciator is off.
7 On overhead panel 430VU, check that FAULT legend of AUTO/MODE pushbutton switch is off.
8 On overhead panel, place PITCH TRIM 1 and 2 levers in ON position (Ref. 22-27-00, P. Block 501).
9 On R ECAM display unit, on the FUEL page, make certain that there are 1000 Kg of fuel in the trim tank. Refuel the trim tank if necessary (Ref. 12-11-28, P. Block 301).
(b)Test
NOTE : The test described below concerns ADS system 1. For ADS system 2 test which is identical, refer to information between parentheses.

ACTION	RESULT
1. On ECAM control panel - press RCL pushbutton switch - then press CLR pushbutton switch as many times as necessary to call up MEMO page.	- On left ECAM display unit, MEMO page is displayed. - On right ECAM display unit, DOOR page is displayed. - On CAPT and F/O main instrument panels 3VU and 5VU, MASTER WARN and MASTER CAUTION lights are off. - Aural warning stops (if it was in operation).
2. By means of pitch trim control switch on CAPT (F/O) control wheel, place pitch trim control wheel at 1 deg. nose down side. On maintenance panel, press ADS SYS1 (SYS2) pushbutton switch.	- On left ECAM display unit, NAV ADC 1 (2) FAULT message appears during a few seconds. - Then VMO/MMO warning is displayed on left ECAM display unit. - Continuous repetitive chime is heard. - MASTER WARN lights flash. - After at least one minute, on overhead panel 430VU, check that FAULT legend of AUTO/MODE pushbutton switch comes on. - On left ECAM display unit, FUEL EXCESS AFT CG message appears in red.
3. Move pitch trim control wheel to 0.5 deg. nose up side.	- FAULT legend of AUTO/MODE pushbutton switch goes off. - On left ECAM display unit, FUEL EXCESS AFT CG message disappears.
4. On maintenance panel, release ADS SYS1 (SYS2) pushbutton switch.	- Continuous repetitive chime stops. - MASTER WARN lights go off. - On left ECAM display unit, MEMO page is displayed.
5. On overhead panel 21VU, open the FWC1 circuit breaker 7WW and FWC2 circuit breaker 32WW. After 10 seconds, close FWC1 circuit breaker 7WW, and 3 seconds later close FWC2 circuit breaker 32WW. Wait a few seconds for FWC reset	

ACTION	RESULT
completion. (c)Close-up - Restore system and aircraft to normal operating condition. - De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).	

R ECAM SYSTEM - DEACTIVATION/REACTIVATION

R FLIGHT WARNING COMPUTERS - DEACTIVATION/REACTIVATION

R Ref. MMEL Section 1-31, Item 4 (FWC)

CAUTION : THIS PROCEDURE IS TO BE USED ACCORDING TO THE REQUIREMENTS OF THE MMEL.

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

1. Deactivation

R A. Reason for the Job
The following deactivation procedure must be only applied when FWC2 is giving spurious warnings continuously.
Both parts of the FWC2 (acquisition and process) are lost after deactivation.

B. Equipment and Materials

ITEM	DESIGNATION
(1)	Placard
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

C. Procedure
- In the flight compartment, install a placard to inform the crew of FWC2 deactivation.

Test

ACTION	RESULT
On overhead panel 21VU, open the relevant C/B of the FWC2 32WW : ECAM/FWC2 (location 109/A8)	

2. Reactivation
- In the flight compartment, remove placard and close the relevant C/B of the FWC2.

3. Close up
Make an appropriate entry in aircraft technical log.

**ON A/C ALL

CLEARING OF FWC BITE MEMORY - MAINTENANCE PRACTICES

1. Reason for the Job
To reset the FWC BITE non volatile memory on aircraft without removing the FWC.

2. Equipment and Materials

ITEM	DESIGNATION
(1) E0052R16B26PNF	Connector
(2) NSA938151PA2000	Pin
R or	
R EN3155-018M2018	Pin
(3) E0261 CF24	Wire
Referenced Procedure	
- TSM 31-50-00	Central Warning Systems - Fault isolation
- 31-53-34, P. Block 401	Flight Warning Computer (1WW1, 1WW2)

3. Procedure

**ON A/C ALL

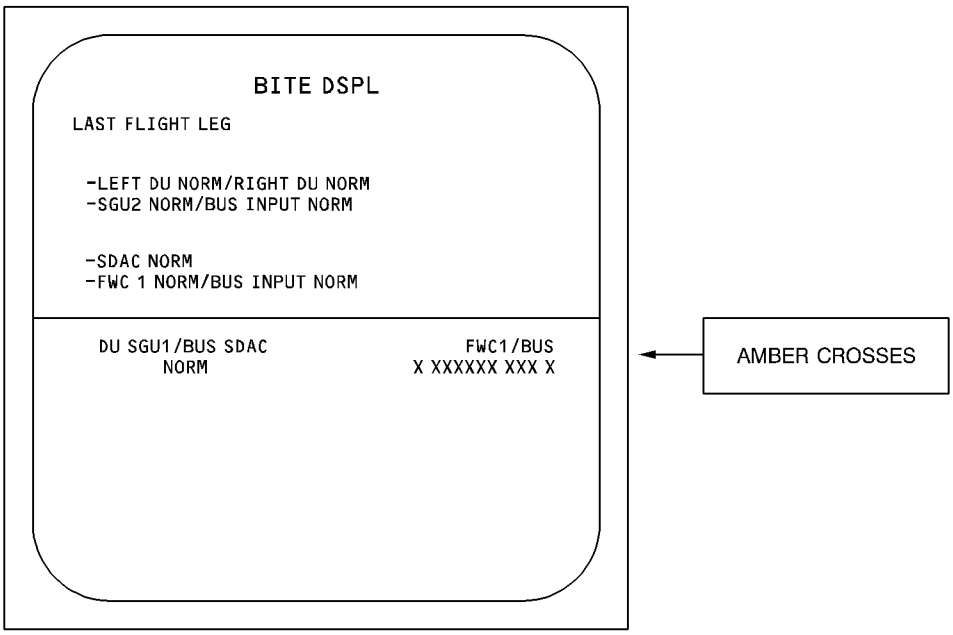
(Ref. Fig. 201)

**ON A/C ALL

(Ref. Fig. 202)

**ON A/C ALL

(Ref. Fig. 203)



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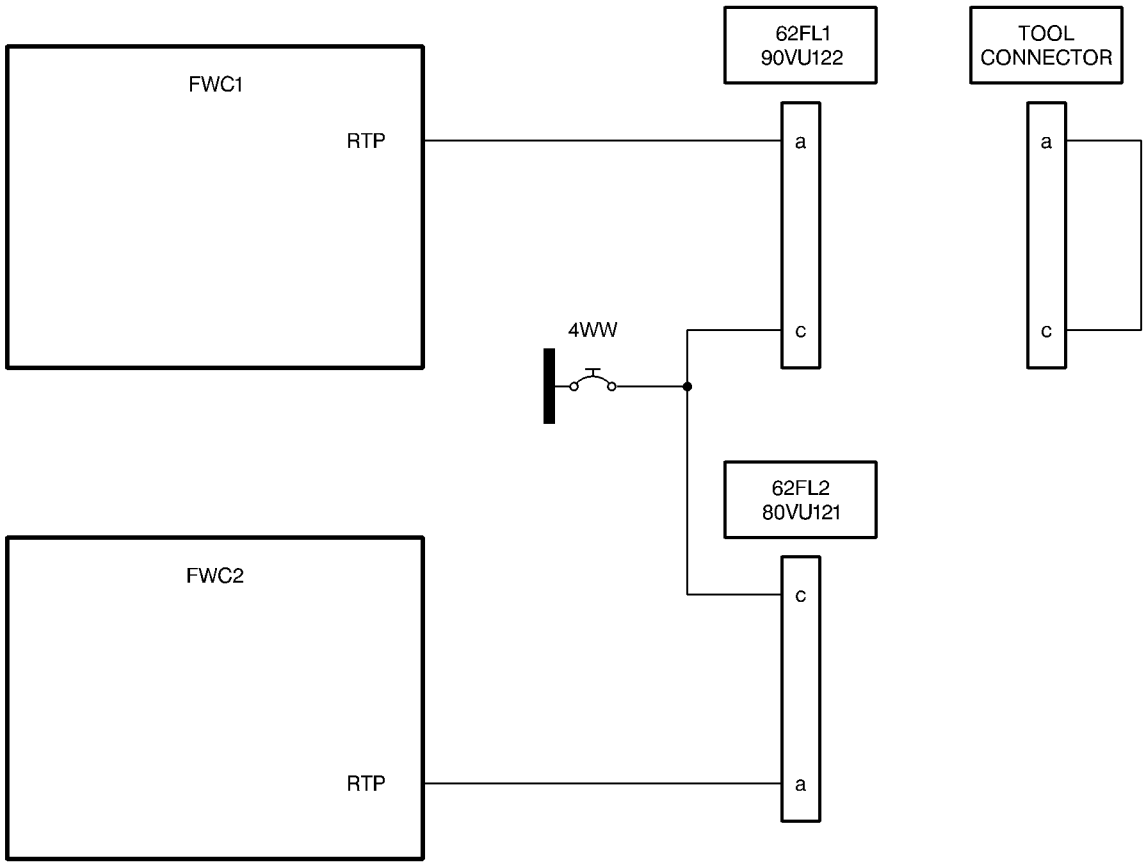
Presentation of ECAM Display
Figure 201



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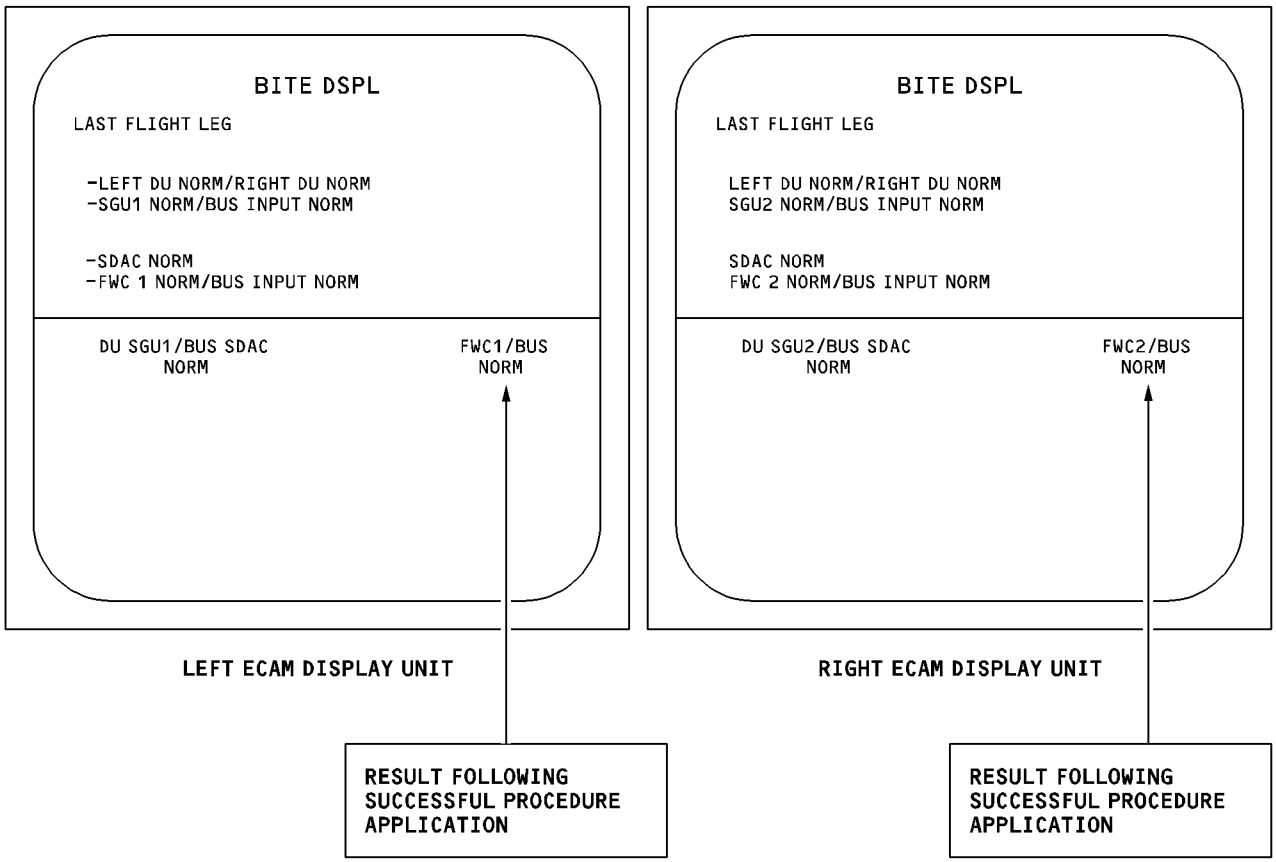
Interconnection Wiring Diagram
Figure 202

R



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Presentation of ECAM Display
After Application of the Procedure
Figure 203

**ON A/C ALL

CAUTION : THIS PROCEDURE IS ONLY APPLICABLE TO FWC P/N 35-0B5-3005-313.

A. FWC BITE Fault Confirmation
On maintenance panel 47OVU, if DSPL legend of ECAM/BITE pushbutton switch 16WT is on, perform FWC BITE DISPLAY test (Ref. TSM 31-50-00, P. Block 101).
(1)If FWC1(2) BITE display shows amber crosses (Ref. Fig. 201), clear FWC BITE memory (Ref. para. 3.B.).
(2)If a specific FWC BITE code is displayed, refer to TSM 31-50-00 for fault analysis.

B. Clearing of FWC BITE Memory
(1)On overhead C/B panel 21VU, open ECAM/FLT WARN MONITOR circuit breaker 4WW.
(2)In R(L) electronics rack 90VU(80VU) :
(a)Make a tool connector using connector P/N E0052R16B26PNF.
Make a strap between connector terminals a and c using two pins
R P/N NSA938151PA2000 or P/N EN3155-018M2018 and a 50 mm (2 in.) long
R wire P/N E0261 CF24.
(b)Connect tool connector to fixed test plug connector 62FL1 (62FL2) for FWC1 (FWC2) (Ref. Fig. 202).
(3)On overhead C/B panel 21VU
(a)Open ECAM/FWC 1 and ECAM/FWC 2 circuit breakers 7WW and 32WW.
(b)Close ECAM/FLT WARN MONITOR circuit breaker 4WW.
(c)Close ECAM/FWC 1 and ECAM/FWC 2 circuit breakers 7WW and 32WW.
(d)Wait at least 15 seconds.
(e)Open ECAM/FLT WARN MONITOR circuit breaker 4WW.
(f)Open ECAM/FWC 1 and ECAM/FWC 2 circuit breakers 7WW and 32WW.
(g)After 10 seconds, close again ECAM/FWC 1 and ECAM/FWC 2 circuit breakers 7WW and 32WW.
(4)Perform FWC BITE DISPLAY test
(a)If NORMAL is shown on the ECAM display related to the FWC whose BITE memory has been cleared (Ref. Fig. 203), then no further actions are required.
(b)If FWC 1(2) BITE display still shows amber crosses (Ref. Fig. 201), replace the related FWC (Ref. 31-53-34, P. Block 401).
(c)If a specific FWC BITE code is displayed, refer to TSM 31-50-00 for fault analysis.
(5)Close-Up
(a)Remove tool connector from fixed connector 62FL1 (62FL2).
(b)Close ECAM/FLT WARN MONITOR circuit breaker 4WW.
(c)Restore system and aircraft to normal operating condition.

AUTOLAND WARNING LIGHT (22WW, 23WW) - REMOVAL/INSTALLATION

1. Reason for the Job
Self - Explanatory

2. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(Ref. Fig. 401)

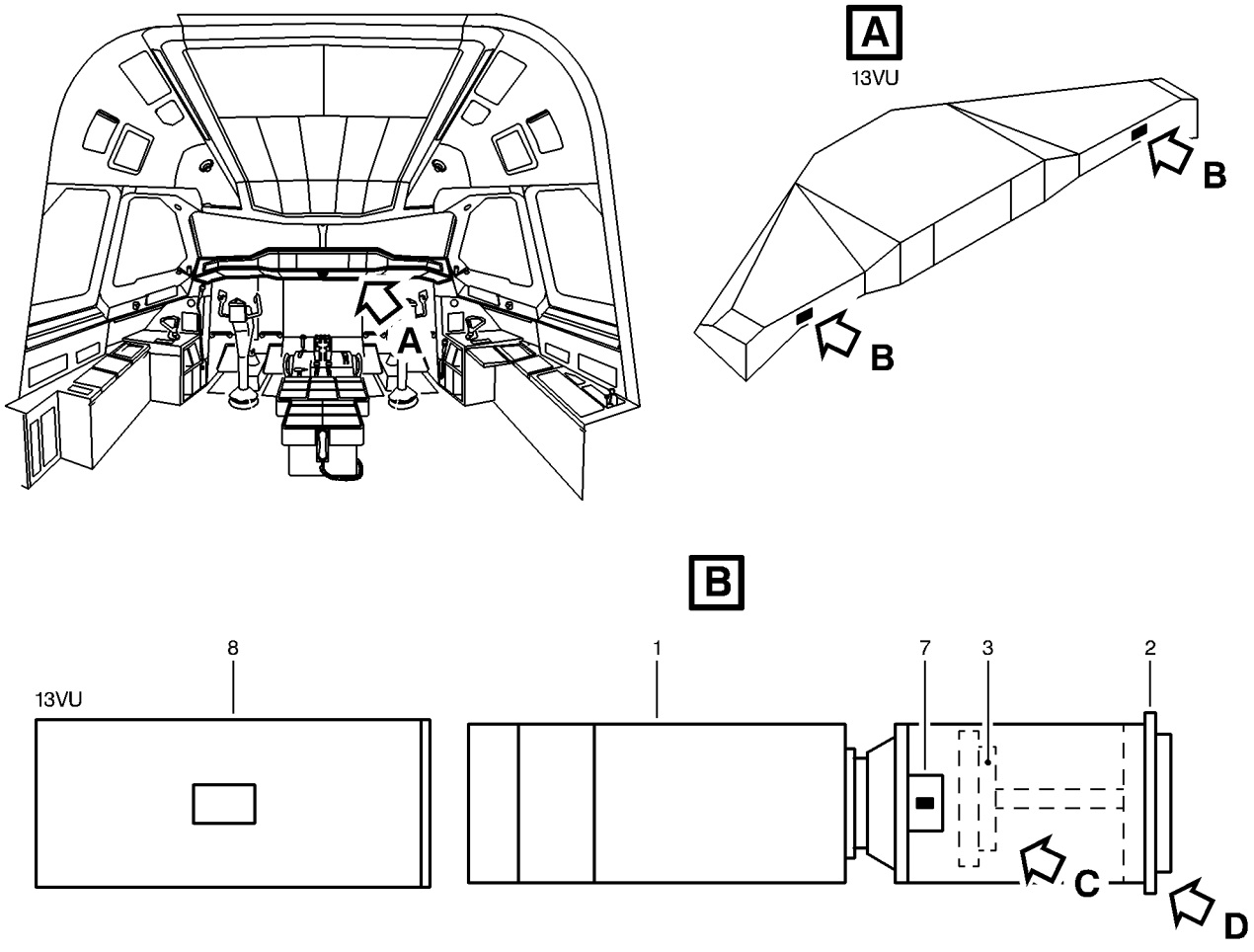
3. Procedure

A. Job Set-up
Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
21VU	ECAM/FLT WARN MONITOR	4WW	108/B6
21VU	ECAM/FLT WARN MONITOR	24WW	108/B7

B. Removal
(1)Remove the warning light head (2) by pulling the cap (4) forward. This operation gives access to the lamps (3) and to the inner part of the warning light (1).
(2)Remove the engraved cap (4) : hold it between your thumb and middle finger, nails in grooves, and laterally slide it out of the tenon.
(3)Remove the filters (5) and (6).
NOTE : Filter removal requires removal of the warning light head (2).
(a)Remove the diffusion filter (5) : disengage it from the tenon and slide it out laterally.
(b)Remove the red filter (6) : disengage it from the tenon and slide it out laterally.
(4)Push the lamps (3) backward to remove them.
(5)Turn the two screws (7) inside the warning light (1) by a quarter turn : this releases the two catches that attach the warning light (1) to the support (8).
(6)Remove the warning light (1).

C. Installation
(1)Engage the warning light (1) on the support (8).
(2)Turn the two inner screws (7) by a quarter turn.
(3)Slide the following components onto the warning light head (2) in this sequence :
- red filter (6), with slot over tenon : engage the filter (6) on the tenon.
- diffusion filter (5), with slot over tenon : engage the filter (5)



Autoland Warning Light
Figure 401

on the tenon.
- engraved cap (4), with slot over tenon : slide the cap until it engages on the tenon.

(4)Engage the warning light head (2) until it locks in position.

D. Test

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(2)Make certain that electronics racks ventilation is correct.
(3)Make certain that LIGHTING circuit breakers on panel 132VU are closed.
(4)Remove safety clips and tags and close circuit breakers 4WW and 24WW.

ACTION	RESULT
1. On panel 436VU :	On panel 13VU :
- place ANN LT switch in TEST position	- AUTOLAND warning lights come on
- place ANN LT switch in BRT position	- AUTOLAND warning lights go off
2. On panel 13VU :	
- push and hold Captain or F/O AUTOLAND warning light	- AUTOLAND warning lights flash
- release AUTOLAND warning light	- AUTOLAND warning lights go off

E. Close-Up

(1)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(2)Restore system and aircraft to normal operating condition.

LOUDSPEAKER (17WW, 18WW) - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure	
R - 21-21-23, P. Block 401	Flight Compartment Ceiling Air Outlet
- 31-51-00, P. Block 501	ECAM System

(Ref. Fig. 401)

2. Procedure

A. Job set-up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
22VU	AUDIO SYST CTL PNL F/O	31RN	205/E20
21VU	ECAM-FLT WARN MONITOR	24WW	108/B 7

B. Removal

R (1)Remove LH(RH) ceiling air outlet to get access to CAPT (F/O) loudspeaker
R (Ref. 21-21-23, P. Block 401).
(2)Remove the four locking screws (3) while holding loudspeaker (4).
(3)Withdraw loudspeaker (4) from housing (1)
(4)Disconnect and blank electrical connectors (2)
(5)Remove loudspeaker (4).

C. Installation

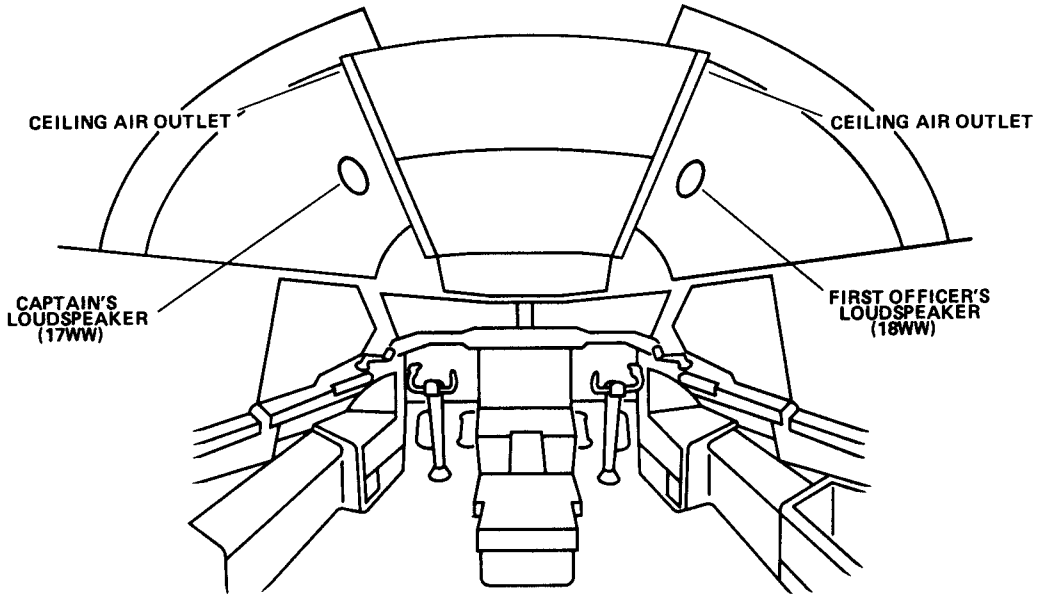
(1)Clean and inspect loudspeaker (4) interface and/or adjacent area.
(2)Remove blanking caps from electrical connectors (2) and check for correct condition.
(3)Connect electrical connectors (2)
(4)Install loudspeaker (4) in housing (1)
(5)Tighten the four locking screws (3)
R (6)Install LH(RH) ceiling air outlet (Ref. 21-21-23, P. Block 401).
(7)Remove safety clips and tags and close circuit breakers : 31RN and 24WW.

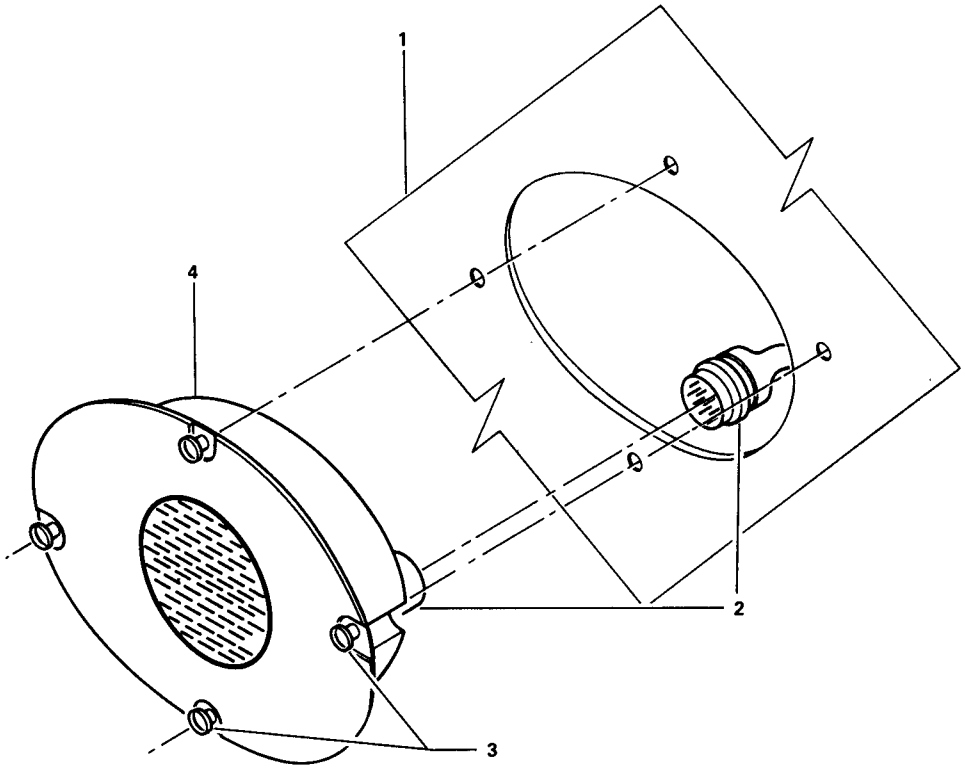
D. Test

Carry out operational test of ECAM system (Ref. 31-51-00, P. Block 501 para 1.C. loudspeaker/WARNING SYS NORM CANCEL test).

E. Close-Up

Make certain that working area is clean and clear of tools and miscellaneous items of equipment.





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R

Loudspeaker
Figure 401

FLIGHT WARNING COMPUTER (1WW1, 1WW2) - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedures	
- 31-51-00, P. Block 501	ECAM System
- 22-00-00, P. Block 501	Auto Flight System
- 22-40-00, P. Block 501	System Monitor

(Ref. Fig. 401)

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers
(a)For FWC1

PANEL	SERVICE	IDENT.	LOCATION
21VU	ECAM/FWC1	7WW	108/B 8

(b)For FWC2

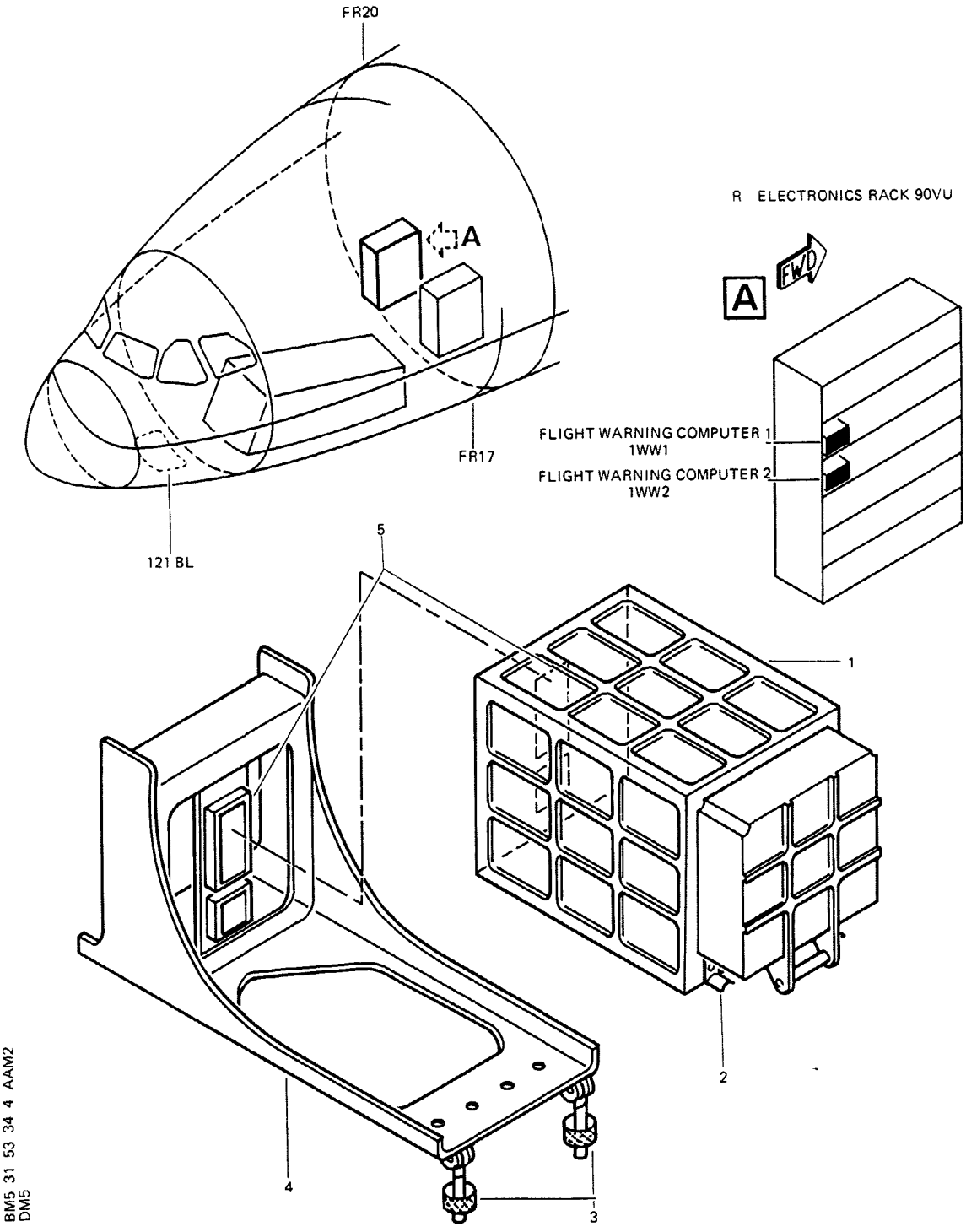
PANEL	SERVICE	IDENT.	LOCATION
21VU	ECAM/FWC2	32WW	109/A 8

(2)Open access door 121BL and gain access to FWC to be removed.

B. Removal
(1)Unscrew knurled nuts (3) on face of rack (4) and tilt them downwards.
(2)Withdraw computer (1) from rack (4).
(3)Blank electrical connectors (5)
(4)Remove computer (1)

C. Installation
(1)Clean and inspect computer (1) interface and/or adjacent area.
(2)Remove blanking caps from electrical connectors (5).
(3)Check for correct condition of electrical connectors (5).
(4)Install computer (1) in rack (4) making certain that connectors are correctly aligned.
(5)Lift retaining nuts into position on studs (2) and tighten.
(6)Remove safety clips and tags and close circuit breakers 7WW and 32WW.

D. Test



Flight Warning Computer
Figure 401

ACTION	RESULT
1. Perform an ECAM display test	- Read the FWC1 software code on left ECAM display unit. - Read the FWC2 software code on right ECAM display unit. - Check that both FWC software codes are identical.

Perform operational test of ECAM system (Ref. 31-51-00, P. Block 501, para 1.A. Flight Warning Computer Test) and an INPUTS test (Ref. 31-51-00, P. Block 501 para. 1.H)
Carry out AFS test (Ref. MM 22-40-00, P. Block 501 para. 1. A.).
Carry out LAND test (Ref. MM 22-40-00, P. Block 501 para. 1. B.) if A/C is operated in actual auto-land CAT 3 conditions.

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)Close access door 121BL.

PRESSURE TRANSMITTER (15WV, 16WV, 17WV) - REMOVAL/INSTALLATION

Removal/Installation of pressure transmitter (15WV, 16WV, 17WV) is dealt with in topic 29-32-13, P. Block 401.

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure	
- 31-51-00, P. Block 501	ECAM System
- 24-41-00, P. Block 301	AC External Power Control

(Ref. Fig. 401)

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers :

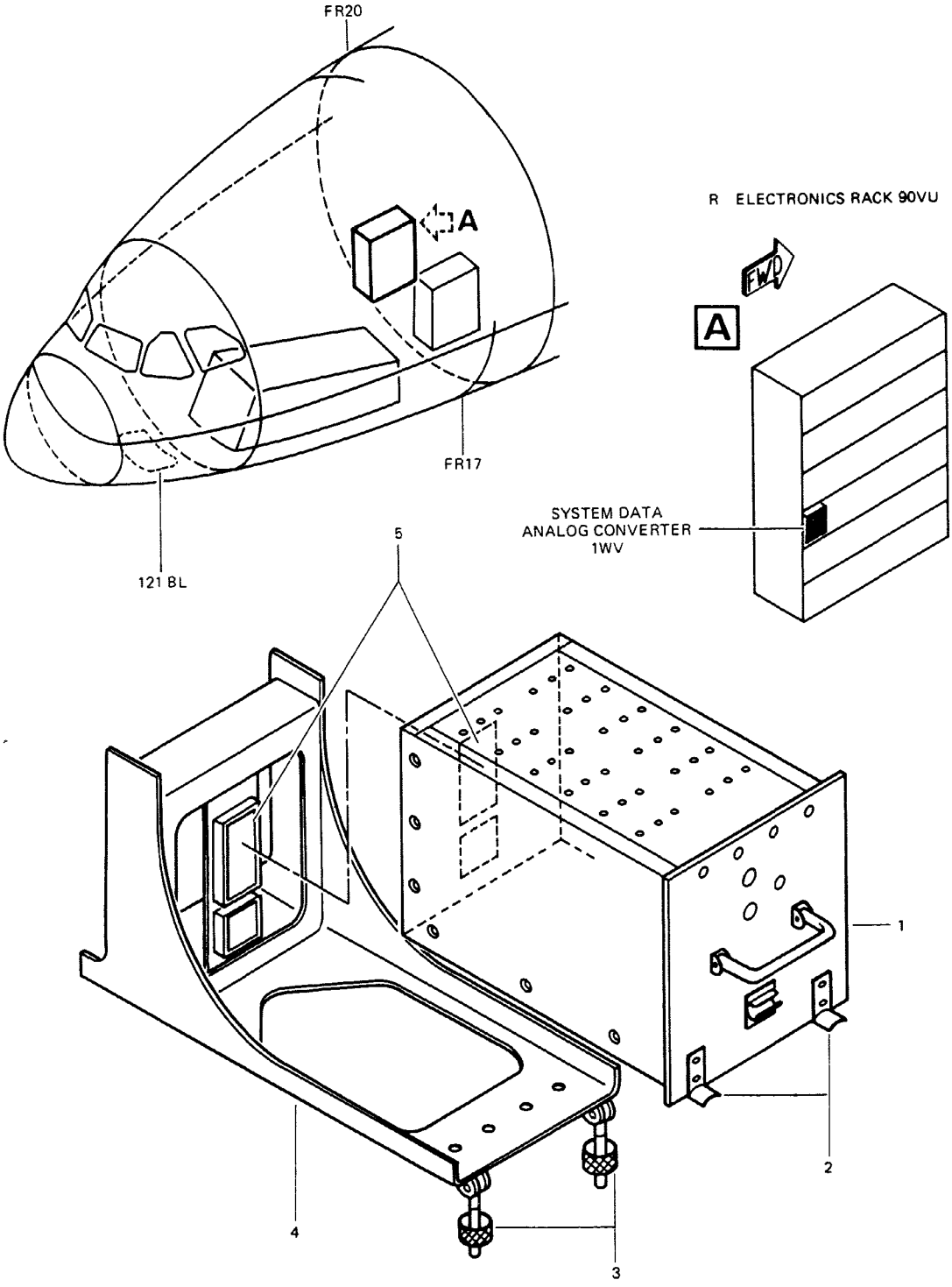
PANEL	SERVICE	IDENT.	LOCATION
21VU	SDAC/26VAC/NORM 1	3WV1	109/A 2
21VU	SDAC/26VAC/NORM 2	3WV2	109/A 3
21VU	SDAC/26VAC/ESS	5WV	109/A 4
21VU	ECAM/SDAC/PWR SUPPLY	6WV	109/A 5

(2)Open access door 121BL and gain access to SDAC.

B. Removal
(1)Unscrew knurled nuts (3) on face of rack (4) and tilt them downwards.
(2)Withdraw SDAC (1) from rack (4)
(3)Blank electrical connectors (5)
(4)Remove SDAC (1)

C. Installation
(1)Clean and inspect SDAC interface and/or adjacent area.
(2)Remove blanking caps from electrical connectors (5).
(3)Check for correct condition of electrical connectors (5).
(4)Install SDAC (1) in rack (4).
(5)Lift retaining nuts into position on studs (2) and tighten.
(6)Remove safety clips and tags and close circuit breakers 3WV1, 3WV2, 5WV and 6WV.

D. Test
Perform operational test of ECAM system (Ref. 31-51-00, P. Block 501, para.1.B SDAC Test). Then perform the following test :
(1)Initial conditions
- correct electrical power supply
- forward services ventilation system in operation
- overhead panel circuit breakers closed, particularly those associated with ECAM



System Data Analog Converter
Figure 401

- ECAM in operating condition.

(2)Test procedure

ACTION	RESULT
1. On ECAM control panel (center pedestal) select AC page	On ECAM control panel AC pushbutton switch light comes on. On R ECAM display unit, ELEC AC page is displayed
2. Check that information displayed on R ECAM display unit is in accordance with overhead panel configuration	
Examples : - ESS BUS or BUS 1 or BUS 2	
When present	is displayed green
When missing	is displayed amber
- Generator voltage	voltage displayed is the same as voltage indicated on overhead panel
When 110 ≤ voltage ≤ 120 V	voltage is displayed green
When 120 V ≤ voltage	voltage is displayed amber
When GEN pushbutton switch is selected OFF	OFF (white) replaces voltage indication
- External power voltage	
When 110 ≤ voltage ≤ 120 V	voltage is displayed green
When voltage < 110 V or 120 V < voltage	voltage is displayed amber
When voltage ≤ 50 V	voltage is not displayed
- External power frequency	
When 390 Hz ≤ frequency ≤ 410	frequency is displayed green
When frequency > 410 or frequency < 390	frequency is displayed amber
When EXT PWR pushbutton switch is selected OFF	frequency is not displayed.
- IDG temperature	
When IDG is disconnected	DISC is displayed
When IDG is connected	t° displayed ranges from 0° to 149°
When t° ≥ 142°C	t° display flashes

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(3)Close access door 121BL.

ECAM CONTROL PANEL 5WT - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure - 24-41-00, P. Block 301	AC External Power Control

(Ref. Fig. 401)

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers :

PANEL	SERVICE	IDENT.	LOCATION
21VU	ECAM-CTL PNL-LT	12WT	108/B01
132VU	LIGHTING-INTEGRAL LT-C/B AND OVHD AND PED	3LF	322/N77
21VU	ECAM SGU1	11WT1	108/B04

B. Removal

(1)Unscrew quick release fasteners (1).
(2)Remove ECAM control panel (2) from its mount (5)
(3)Disconnect electrical connector (4)
(4)Blank the two electrical connectors (3) and (4)
(5)Remove ECAM control panel (2).

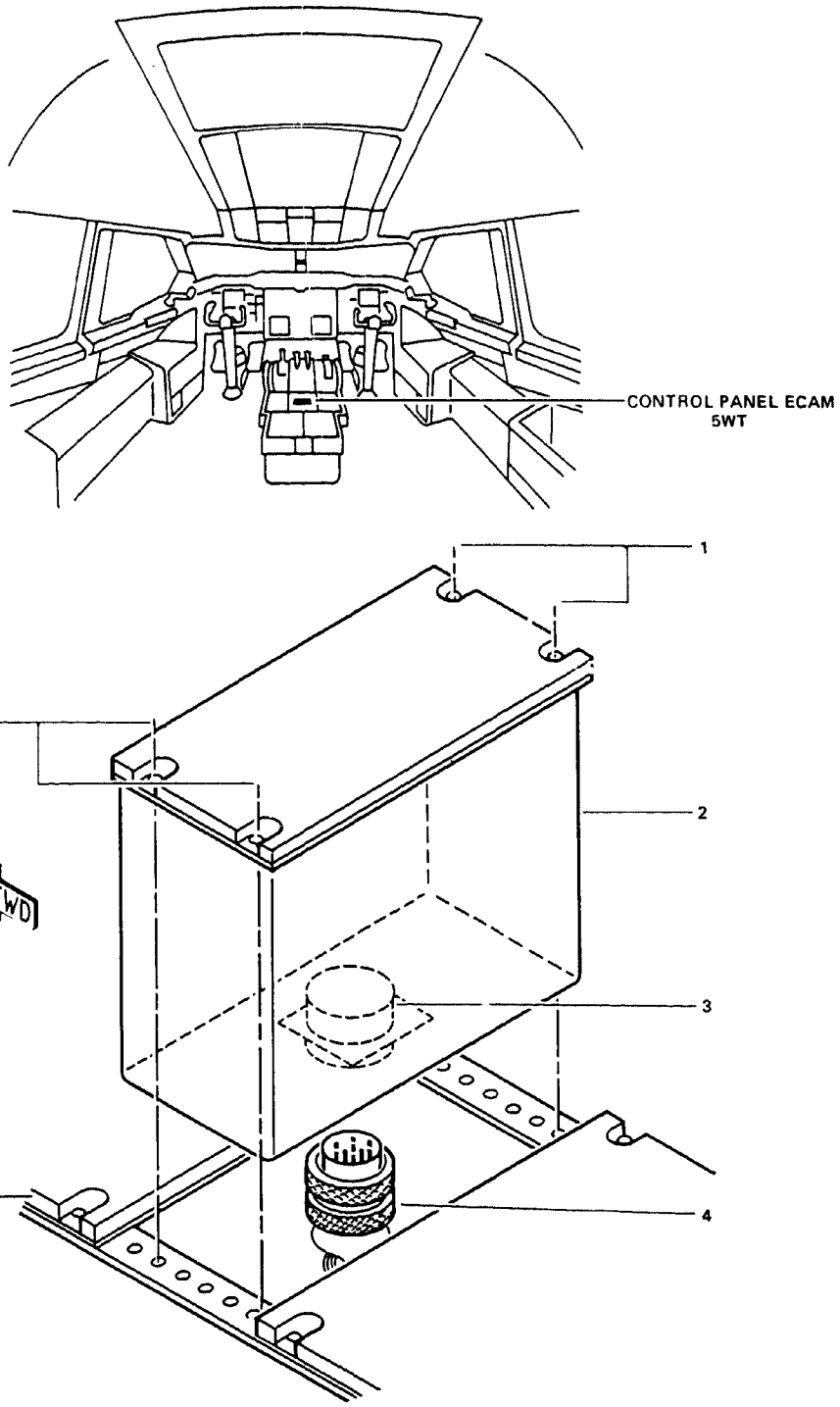
C. Installation

(1)Clean and inspect ECAM control panel interface and/or adjacent area.
(2)Remove blanking caps from the electrical connectors (3) and (4).
(3)Connect electrical connector (4) to receptacle (3) of ECAM control panel.
(4)Install ECAM control panel (2) in its mount (5).
(5)Tighten quick release fasteners.
(6)Remove safety clips and tags and close circuit breakers 12WT, 11WT1 and 3LF.

D. Test

Initial Conditions

(1)Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(2)Make certain that electronics racks ventilation is correct.
(3)Close overhead panel circuit breakers, particularly those associated with ECAM.



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DM5

ECAM Control Panel
Figure 401

ACTION	RESULT
1. On ECAM control panel	
- release ECAM SGU1 pushbutton switch	OFF legend on ECAM SGU1 pushbutton switch comes on
- release ECAM SGU2 pushbutton switch	OFF legend on ECAM SGU2 pushbutton switch comes on.
- press ECAM SGU1 and ECAM SGU2 pushbutton switches	Both legends go off
- check operation of brightness control knob :	
- place LEFT DISPLAY knob in OFF position	Left display unit is off.
- place knob in BRT (bright) position then in mid-position	On left display unit brightness varies with knob position.
- place RIGHT DISPLAY knob in OFF position	Right display unit is off
- place knob in BRT position then in mid-position	On right display unit brightness varies with knob position.
2. To simulate a fault, on rear panel 133VU open AC BUS 1 WARN RELAY circuit breaker 9 XN : (Line 335-R/78)	On left ECAM display unit the following message appears : ELEC _____ (amber) AC BUS 1 OFF (amber) On CAPT and F/O main instrument panels 3VU and 5VU, MASTER CAUTION lights come on. On ECAM control panel CLR legend comes on.
3. On ECAM control panel, press CLR pushbutton switch as many times as necessary, until CLR legend goes off	On left ECAM display unit, the message is cleared and replaced by a MEMO page. On panels 3VU and 5VU, MASTER CAUTION lights go off.
4. On panel 133VU, open circuit breakers 1GB and 2GB : HYDRAULIC - L/G PROX AND RELAYS SYS2 FLT GND for 1GB (line 331-V52) HYDRAULIC - L/G PROX DET AND RELAYS SYS1 RETRACT CTL for 2GB (line 332-U51). On center pedestal, cancel aural warning using WARNING SYS/NORM CANCEL pushbutton switch.	
5. On ECAM control panel	On left ECAM display unit :
- press STS pushbutton switch	- a status message is displayed
- press CLR pushbutton switch	- the status message is cleared.
- press RCL pushbutton switch	- the previous warning message is

ACTION	RESULT
	displayed again : ELEC AC BUS 1 OFF
6. Close circuit breakers 1GB and 2GB and 9XN, on panel 133VU. On ECAM control panel, - press a system pushbutton switch, then another one, and so on until all pushbutton switches have been pressed	On right ECAM display unit the relevant page appears.

E. Close-Up
(1)Make certain that working area is clean and clear of tools and miscellaneous items of equipment.
(2)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(3)Restore system and aircraft to normal operating condition.

L (R) ECAM DISPLAY UNIT 1WT (3WT) - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breakers Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure - 31-51-00, P. Block 501	ECAM System

2. Procedure

A. Job Set-Up

(1)Open, safety and tag the following circuit breakers.

(a)For L ECAM display unit 1WT

PANEL	SERVICE	IDENT.	LOCATION
21VU	ECAM/DISPLAY UNIT L	7WT	108/B02
132VU	LIGHTING - INTEGRAL LT - MAIN PNL AND GLARE SHLD	1LF	322/N76

(b)For R ECAM display unit 3WT

PANEL	SERVICE	IDENT.	LOCATION
21VU	ECAM/DISPLAY UNIT R	8WT	108/B03
132VU	LIGHTING - INTEGRAL LT - MAIN PNL AND GLARE SHLD	1LF	322/N76

B. Removal

(1)Simultaneously press both locking catches (4) towards screen.

(2)If necessary, release force applied to catches by pushing handle (3) upwards
- handle falls at catches level.

(3)Progressively move handle (3) down to screen lower section.
- simultaneously unit is extracted from panel by approx. 3 cm.

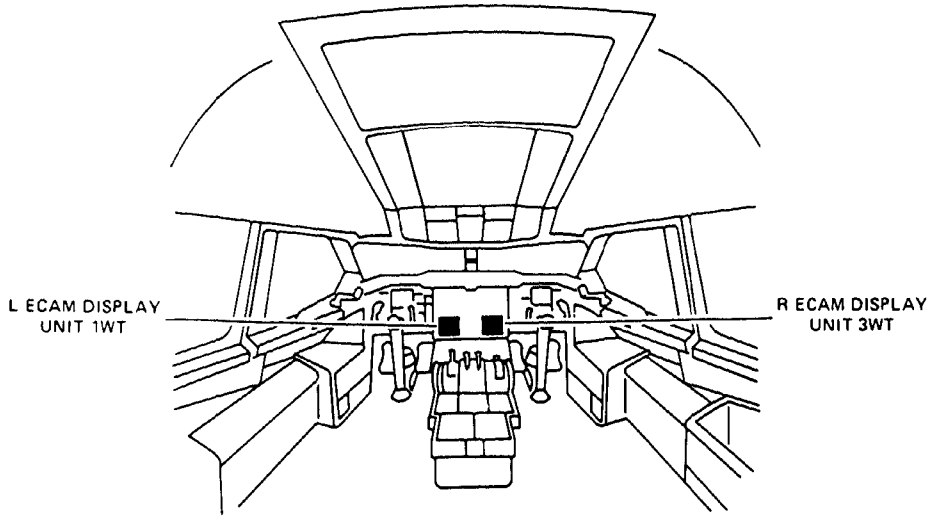
(4)Pull handle positioned at extraction point and remove unit (2).

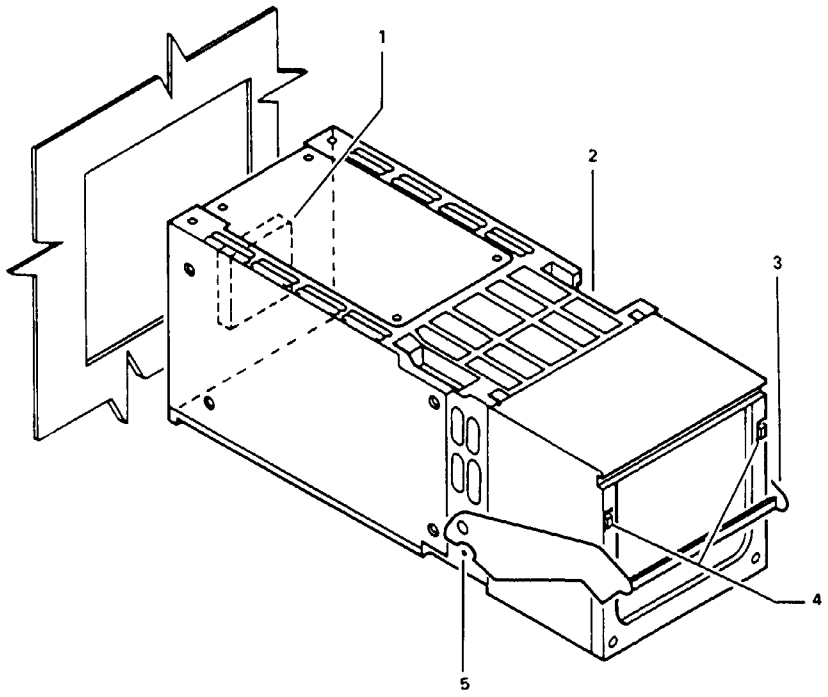
(5)Blank rear connector (1) and protect screen. Immediately place unit in replacement unit packing.

C. Installation

(1)Clean and inspect ECAM display unit interface and/or adjacent area.

(2)In housing
- check for correct condition of ventilation air inlet (presence of interface flexible seal and no obstruction of duct)
- check on both sides that locking studs are not damaged.
- check for correct condition of connector.





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DM5

L ECAM Display Unit
Figure 401

(3)Remove blanking cap from connector (1).
(4)Position unit at opening in panel.
NOTE : Move handle FULLY downwards to screen lower section.
(5)Push unit until locking studs come into contact with movable locking book (5). (Unit face protrudes then by approx. 3 cm with respect to panel).
(6)While pushing on both sides of unit, allow handle to move FREELY up to locking catches (4) level (Unit face is then flush with panel).
(7)Progressively move handle to its maximum up position until locking catches are click-stopped and locked under handle.
(8)Remove safety clips and tags and close circuit breakers :
(a)For L ECAM display unit 1WT : 7WT and 1LF
(b)For R ECAM display unit 3WT : 8WT and 1LF.

D. Test
Perform operational test of ECAM system (Ref. 31-51-00, P. Block 501, Para 1. G. DISPLAYS Test).

E. Close-Up
Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

1. Reason for the Job
Self-Explanatory

2. Job Set-up Information

A. Fixtures, Tools, Test and Support Equipment

ITEM	DESIGNATION
No specific	Absorbent Surgical Cotton Wadding
No specific	Impregnated Screen Pad 2000
No specific	Optical Precision Pad
No specific	Sterile Gauze Pad

B. Consumable Materials

ITEM	DESIGNATION
R Material No. 11-010	USA TT-I-735 Grade A
R	Isopropyl Alcohol (Ref. 20-31-00)
R Material No. 11-020	Visual Display Unit Anti-Static Cleaner
R	(Ref. 20-31-00)

R 3. Procedure

R A. Cleaning of the Screen of the Display Unit
R CAUTION : MAKE SURE THAT YOU OBEY THE INSTRUCTIONS IN THE CLEANING
R PROCEDURE THAT FOLLOWS. INCORRECT CLEANING CAN CAUSE DAMAGE TO
R THE ANTI-REFLECTIVE COATING.
R IT IS NOT PERMITTED TO USE TISSUES SUCH AS KLEENEX TISSUES.
R SUCH TISSUES CAN CAUSE LOCAL REMOVAL OF THE SURFACE TREATMENT,
R AND THUS HALOS OR SCRATCHES.
R ALWAYS APPLY THE CLEANING AGENT TO THE PAD AND NOT TO THE SCREEN.
R (1)Make an absorbent surgical cotton wadding or a sterile gauze pad or a
R optical precision pad moist with CLEANING AGENTS (Material No. 11-020)
R or CLEANING AGENTS (Material No. 11-010) or use a impregnated screen
R pad 2000.
R (2)Move the moist wad (or pad) lightly across the surface of the screen
R (one time only).
R (3)If you find again marks or dust on the screen, do steps (1) and (2)
R again with a new piece of moist wad (or pad). Do these steps again until
R the screen is fully clean.
R NOTE : Use a new pad (or wad) each time to prevent scratches that can
R be caused by a dusty pad.
R (4)Dry the screen with a clean wad (or pad). To do this, move the clean wad
R (or pad) lightly across the surface of screen (one time only).
R NOTE : We recommend to frequently clean the screen to remove finger
R marks or dust.

4. Close-Up

A. Make sure that the work area is clean and clear of tool(s) and other items.

ECAM SGU 9WT1 (9WT2) - REMOVAL/INSTALLATION

1. Equipment and Materials

ITEM	DESIGNATION
A.	Circuit Breaker Safety Clips
B.	Blanking Plugs/Caps
Referenced Procedure - 31-51-00, P. Block 501	ECAM System

(Ref. Fig. 401)

2. Procedure

A. Job Set-Up
(1)Open, safety and tag the following circuit breakers :
(a)For SGU1

PANEL	SERVICE	IDENT.	LOCATION
21VU	ECAM SGU1	11WT1	108/B4

(b)For SGU2

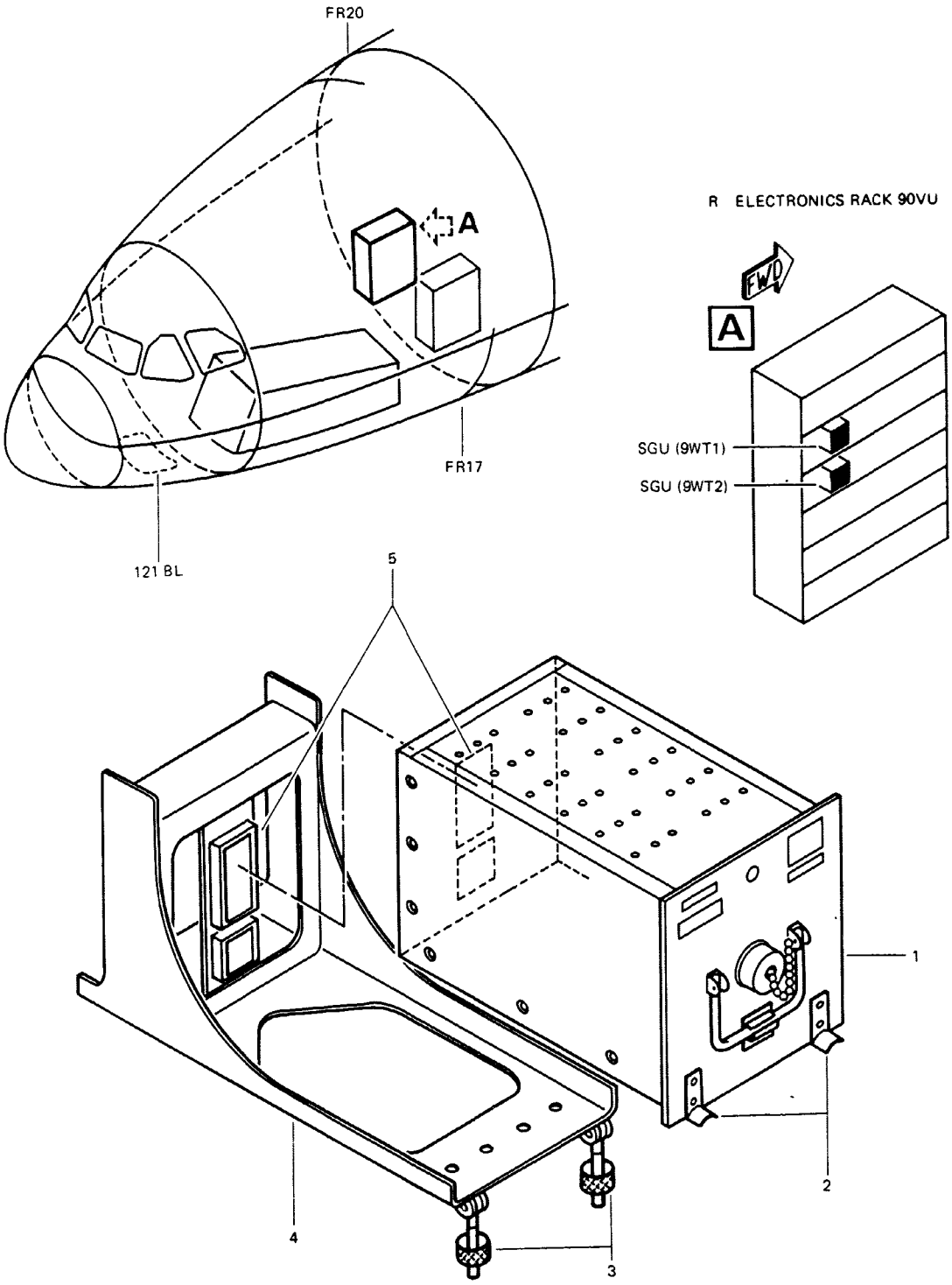
PANEL	SERVICE	IDENT.	LOCATION
21VU	ECAM SGU2	11WT2	108/B5

(2)Open access door 121BL and gain access to SGU to be removed.

B. Removal
(1)Unscrew knurled nuts (3) on face of rack (4) and tilt them downwards.
(2)Withdraw SGU (1) from rack (4) taking care not to damage electrical connectors (5).
(3)Blank electrical connectors (5).
(4)Remove SGU (1).

C. Installation
(1)Clean and inspect SGU (1) interface and/or adjacent area.
(2)Remove blanking caps from electrical connectors (5).
(3)Check for correct condition of electrical connectors (5).
(4)Install SGU (1) in rack (4).
(5)Lift retaining nuts into position on studs (2) and tighten.
(6)Remove safety clips and tags and close circuit breakers.
(a)For SGU1 : 11WT1.
(b)For SGU2 : 11WT2.

D. Test
After installation of ECAM SGU perform the two following ECAM operational tests



SGU
Figure 401

- ECAM SGU Test (Ref. 31-51-00, P. Block 501 para. 1E)
- ECAM/EFIS DISPLAY Test (Ref. 31-51-00, P. Block 501 para. 1G)

E. Close-Up

(1) Make certain that working area is clean and clear of tools and miscellaneous items of equipment.

(2) Close access door 121BL.

CIRCUIT BREAKER MONITORING SYSTEM - DESCRIPTION AND OPERATION

1. General

The initial function of the circuit breakers is to protect the aircraft wiring against overheat in case of short circuit.

- Nevertheless, circuit breakers are frequently used on the ground to isolate electrical circuits for maintenance purpose.

- This implies that during flight compartment preparation, it must be checked that no circuit breaker has been left open by the maintenance personnel.

- The circuit breaker monitoring system is designed to simplify and optimize this check.

- This system however is not designed to monitor circuit breakers in flight, as such failures (amongst others) have been taken into account by the safety analysis of the corresponding system.

- In practice it is never required to close a circuit breaker in flight, since, except the case of circuit breaker failure, the most probable cause of tripping is a true short circuit.

2. System Description

The system comprises monitored circuit breakers which send an electrical signal when opened and a display panel enabling the open circuit breakers to be localized panel by panel.

A. Monitored Circuit Breakers

These circuit breakers are fitted with secondary contacts, the operation of which is reversed with respect to primary contacts :

- the secondary contacts provide an electrical continuity (closed circuit) when the circuit breaker is opened
- the secondary contacts provide an electrical discontinuity (open circuit) when the circuit breaker is closed.

B. Display
(Ref. Fig. 001)

- The circuit breakers are arranged in the flight compartment in two main areas located, one on the overhead panel (20VU), and the other on the rear panel (130VU).
- Each area comprises several circuit breaker panels.
- Rear circuit breaker panel 131VU and overhead circuit breaker panels 21VU and 22VU are each associated with an illuminated pushbutton switch.

- Each rear circuit breaker panel 132VU and 133VU is associated with two illuminated pushbutton switches due to the large size of these panels.

- Each pushbutton switch is associated with alphanumerical coordinates enabling identification of a circuit breaker on a panel.
- For the overhead panel (20VU) :
  panel 21VU : from A1 to J14 (19WY)
  panel 22VU : from A15 to J28 (20WY)

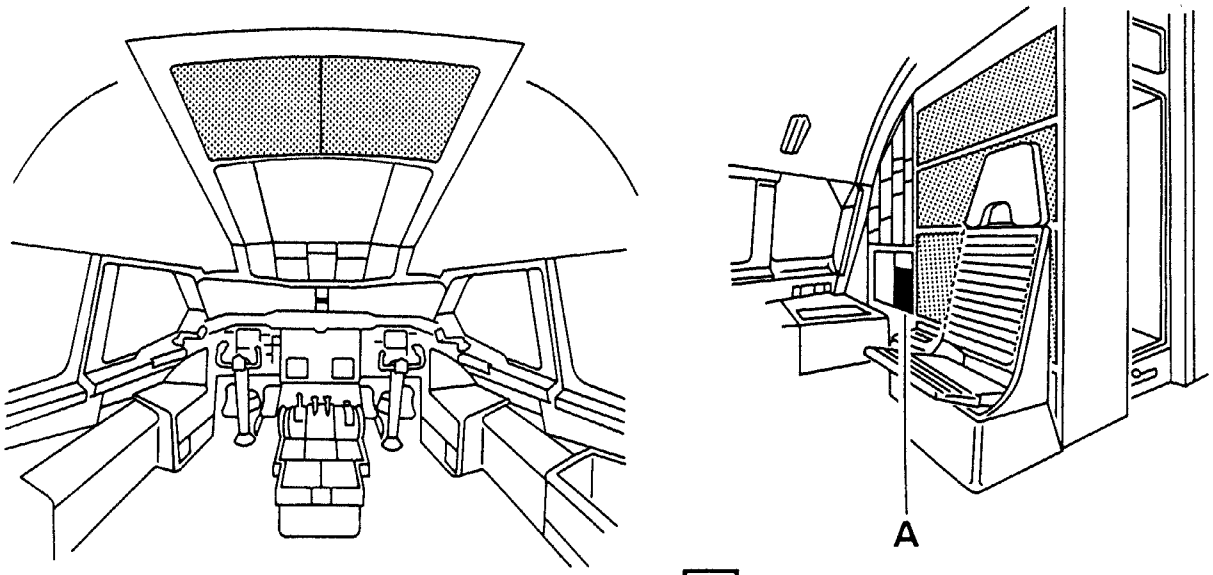
- For the rear panel (130VU)
  panel 131VU : from A51 to H65 (14WY)
  panel 132VU : from J51 to P65 (15WY)
  panel 132VU : from J66 to P85 (16WY)
  panel 133VU : from Q51 to V65 (17WY)
  panel 133VU : from Q66 to V85 (18WY)

The display device therefore comprises seven pushbutton switches with two stable positions.
The face of each pushbutton switch has two integrally lighted displays.
- the upper display enables illumination in white of the **OPEN** legend (this legend is not visible when off).
- the lower display enables illumination in white of the framed **INHIB** legend (this legend is visible when off).

The pushbutton switches are located on the rear panel, on panel 472VU, under the placard : **C/B MONITOR.**
Pushbutton switches corresponding to circuit breakers located on the overhead panel are identified by the placard **OVERHEAD PANEL.**
Pushbutton switches corresponding to circuit breakers located on the rear panel are identified by the placard **REAR PANEL.**

OVERHEAD PANEL CIRCUIT BREAKERS

REAR PANEL CIRCUIT BREAKERS



BM5 31 69 00 0 TGM2 · 21 · 16
DM5

Circuit Breaker Monitoring System - Component Location
Figure 001

3. Circuit Breaker Monitoring Criteria

The circuit breakers that are not monitored are those that, when opened, have for result to :

- illuminate a warning light in the flight compartment.
- cause an incorrect result to a mandatory test during the check list performed by the crew members (the annunciator light test, in particular enables the opening of a great number of circuit breakers to be detected)
- present no risk for the operational utilization of the aircraft and minimum discomfort acceptable for flight (for example the pilots' feet warning system).

NOTE : The two circuit breakers supplying the monitoring system are themselves monitored and located so that the opening of one circuit breaker causes the illumination of a legend supplied by the other circuit breaker.

4. Operation
(Ref. Fig. 002)

A. Operating Principle
The purpose of the monitoring system is to detect circuit breakers which have been left open by the maintenance personnel.
When a monitored circuit breaker is open, the **OPEN** legend on the rear panel comes on.

To prevent the crew from being hindered by illumination of an **OPEN** legend in case of circuit breaker opening in flight, the **OPEN** indication can only come on if both engines are shut down.
In the case where, for particular reasons, it is necessary to fly with a monitored circuit breaker open the **OPEN** legend can be inhibited by pressing the pushbutton switch. This has for result to illuminate the **INHIB** legend, but this indication, unlike the **OPEN** legend, does not come on if **ANN LT** switch **2WB**, which controls the operation of the rear panel annunciator lights is in **OFF** position.

B. Annunciator Light Illuminating Conditions
All annunciator lights come on when **ANN LT** switch **2WB** is in **TEST** position. This case will be dealt with in further descriptions.

(1)**OPEN** indication
OPEN legend comes on if the following conditions are met :
(a)The engines are not running (condition detected by the low oil pressure switch).
(b)Al least one of the monitored circuit breakers associated with the legend is open.
(c)The pushbutton switch is not pressed (in)
Illumination of an **OPEN** legend results, for the **ECAM** system, in a **"C/B MONITOR"** level 1 warning.

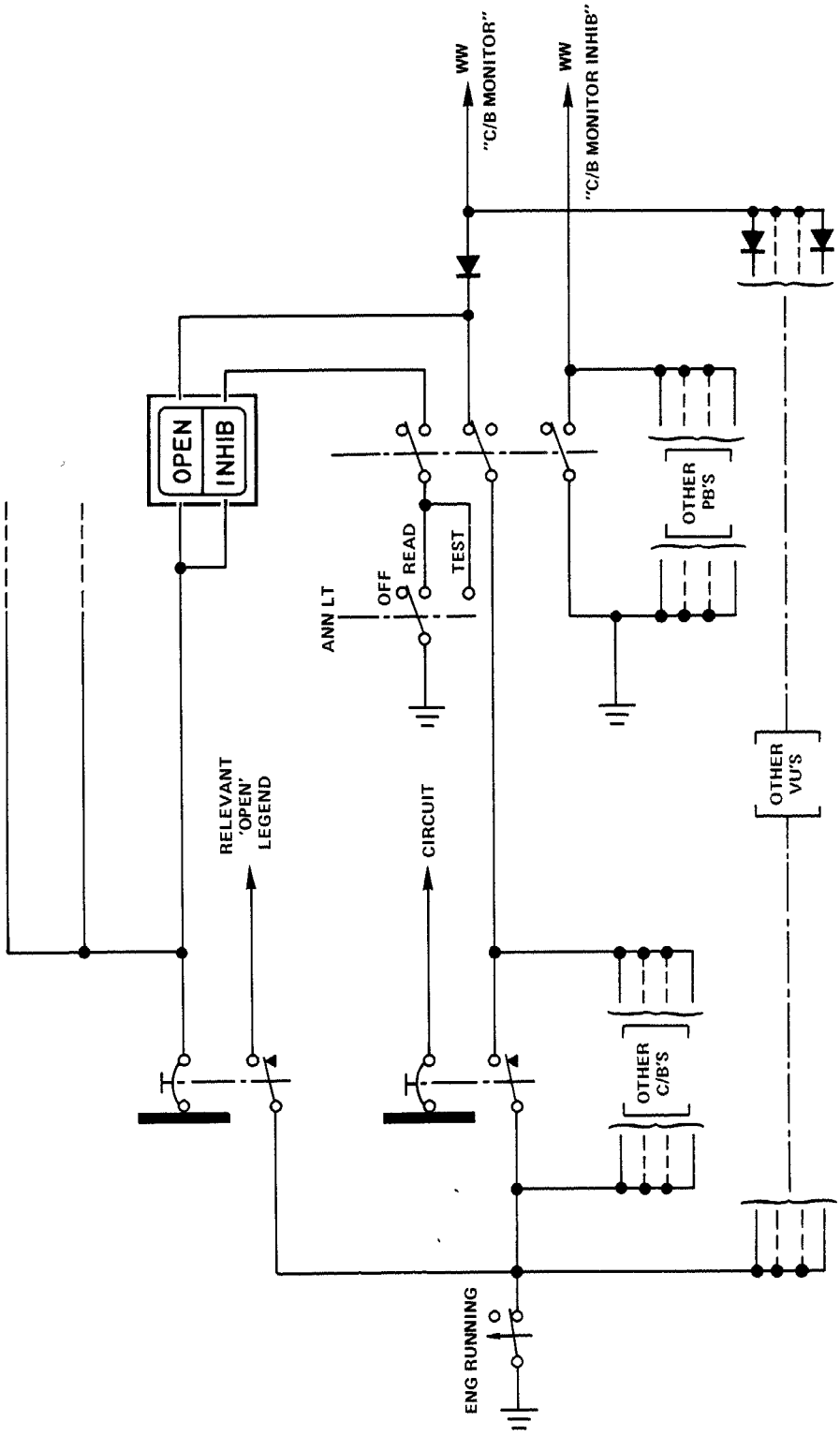
(2)**INHIB** indication
The **INHIB** legend comes on if the following conditions are met :
(a)The corresponding pushbutton switch is pressed (in).
(b)**ANN LT** switch **2WB** is in **READ** position.
Illumination of an **INHIB** legend results, for the **ECAM** system, in a **"C/B MONITOR INHIB"** level 1 warning.

5. List of Monitored Circuit Breakers

A. Circuit Breakers Located on Panel 21VU

FIN	DESIGNATION	RTG	BUS BAR	P|H	M	C	POS
12FU1	ECAM-STICK SHAKER CAPT	3	301PP		M		A09
12FU2	ECAM-STICK SHAKER F/O	3	110PP		M		A10
12TU	AIDS-SENSORS	3	111PP		M	C	E05

FIN	DESIGNATION	RTG	BUS BAR	P H	M	C	POS
12WT	ECAM-CTL PNL LT	3	111PP		M		B01
3WV1	ECAM-SDAC/26VAC/NORM 1	3	131XP	A	M		A02
3WV2	ECAM-SDAC/26VAC/NORM 2	3	231XP	A	M		A03
5WV	ECAM-SDAC/26VAC/ESS	3	331XP	A	M		A04
24WW	ECAM-FLT WARN MONITOR	3	301PP		M		B07
40WW	ECAM-THS POS DET	3	331XP	A	M		A07
10WY	ELEC-CBMS REAR PANEL	3	111PP		M		B13



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Circuit Breaker Monitoring System - Block Diagram
Figure 002

B. Circuit Breakers Located on Panel 22VU

FIN	DESIGNATION	RTG	BUS BAR	P/H	M	C	POS
1CG	RUD TRIM-SLOW	5	303PP		M		J27
1GA	LDG GEAR-EXTEND CTL	3	303PP		M		J28
5HA	AIR BLEED-ENG 1 CONTROLLER MONITOR	3	302XP	C	M		A17
6HB	COMPT TEMP-PACK 2 VALVE	3	306PP		M		G24
7HB	COMPT TEMP-PACK 1 VALVE	3	303PP		M		G22
5HH	COMPT TEMP-PACK 1 MAN CTL	3	302XP	B	M		G20
6HH	COMPT TEMP-PACK 2 MAN CTL	3	302PP	B	M		G26
127HM	CABIN PRESS-MAN VALVE MOTOR-AFT	3	303PP		M		H15
3HV	AIR BLEED-X FEED VALVE NAN CTL	3	302XP	C	M		G18
7PC	ELEC-DC BUS WARN AND ESS DC IND	3	303PP		M		D18
20PC	ELEC-ESS TR REV CURRENT SENSOR	3	308PP		M		D16
1PE	ELEC-BAT PICK UP AND OVHD ANN	3	303PP		M		D22
6PE	ELEC-BAT CNTOR POS ANN	3	303PP		M		D23
30PE	ELEC-BAT CHARGE UNIT AND V IND-BAT 1	3	401PP		M		D24
31PE	ELEC-BAT CHARGE UNIT AND V IND-BAT 2	3	402PP		M		D25
32PE	ELEC-BAT CHARGE UNIT AND V IND-BAT 3	3	403PP		M		D26
3QG	FUEL-LP VALVES MOTOR 2 ENG 1	3	306PP		M		J19
4QG	FUEL-LP VALVES MOTOR 2 ENG 2	3	306PP		M		J20
2QL	FUEL-TRIM TANK-FWD XFR AUX VALVE	3	306PP		M		J21
4RK	RCDR-CVR SUPPLY	3	402XP	A	M		F28
5RK	RCDR-CTL	3	306PP		M		F27
5RY	COM-PASSENGER ADDRESS	10	303PP		M		B15
1WA	AVIONICS SMOKE DET-DETECTORS	3	303PP		M		F25
2WA	AVIONICS SMOKE DET-DETECTORS	3	306PP		M		F24
54WA	VENT-SNIFFER FAN	3	302XP	B	M		H18

R **ON A/C 001-100,

FIN	DESIGNATION	RTG	BUS BAR	P H	M	C	POS
35WH	CARGO SMOKE DET-PWR SUPPLY	3	306PP		M		A26

R **ON A/C ALL

1WL	EMER LT-TOILETS	3	303PP		M		E26
20WL	EMER LT-EXIT LT	10	303PP		M		E27
21WL	EMER LT-EXIT LT	10	303PP		M		E28
1WM	FIRE EXTING-CARGO COMPT BTL 1	7.5	303PP		M		C17
2WM	FIRE EXTING-CARGO COMPT BTL 2	7.5	401PP		M		C18
1WR	PASSENGER OXYGEN CTL AND WARN	5	306PP		M		H24
2WR	PASSENGER OXYGEN-ACTUATION	5	302XP	A	M		H25
3WR	PASSENGER OXYGEN-ACTUATION	5	302XP	A	M		H26
4WR	PASSENGER OXYGEN-ACTUATION	5	302XP	A	M		H27
5WR	PASSENGER OXYGEN-ACTUATION	5	302XP	A	M		H28
3XH	ELEC-AC BUS WARN	3	303PP		M		D17
3XT	ELEC-DISC IDG 1	7.5	303PP		M		D20
4XT	ELEC-DISC IDG 2	7.5	303PP		M		D21

C. Circuit Breakers Located on Panel 131VU

FIN	DESIGNATION	RTG	BUS BAR	P H	M	C	POS
3HA	AIR BLEED-ENG 1 VALVES HP	3	104PP		M		H53
4HA	AIR BLEED-ENG 2 VALVE HP	3	101PP		M		G53
6HA	AIR BLEED-ENG 2 CONTROLLER MONITOR	3	105XP	C	M		D54
11HA	AIR BLEED-ENG 1 VALVES BLEED	3	104PP		M		H54
12HA	AIR BLEED-ENG 2 VALVE BLEED	3	104PP		M		H55
4HF	AIR BLEED-LEAK DET LOOPS L PYLON AND APU AND B	3	105XP	A	M		H51
5HF	AIR BLEED-LEAK DET LOOPS R PYLON AND A	3	205XP	C	M		G51
4HG	VENTILATION-CABIN FANS FWD	10	205XP	3	M		F60
8HG	VENTILATION-CABIN FANS MID	10	205XP	3	M		F63
12HG	VENTILATION-CABIN FAN AFT	10	202XP	3	M		G60
3HH	AIR BLEED AND COMPT TEMP-PACK 1 AUTO CTL	3	105XP	A	M		F55
4HH	AIR BLEED AND COMPT TEMP-PACK 2 AUTO CTL	3	205XP	A	M		F57
7HH	AIR BLEED AND COMPT TEMP-DEMAND TEMP CTL	3	105XP	A	M		F56
2HJ	AIR BLEED-HOT AIR SUPPLY CTL	3	106PP		M		G57
3HK	COMPT TEMP-COCKPIT AND MID CABIN MAN CTL	3	106XP	C	M		F53
6HK	COMPT TEMP-FWD AND AFT CABIN MAN CTL	3	106XP	C	M		F52
4HN	COMPT TEMP-CARGO BULK MAN CTL	3	105XP	C	M		D56
49HQ	VENTILATION-AVIONICS BLOWER CTL	3	101PP		M		D62
11HU	VENTILATION-GALLEY AND LAV FAN SUPPLY	10	106XP	3	M		E60
1KB	APU-AIR INTAKE FLAP	5	301PP		M		B55
1KD	APU-ECB SUPPLY-MAIN	10	301PP		M		B57
2KD	APU-WARN	3	301PP		M		B56
1QC	APU-FUEL PUMP SUPPLY	3	401XP	A	M		A53
11QC	APU-FUEL BLOW OFF PUMP	3	215XP	A	M		A52
1QF	APU-FUEL ISOL VALVE-SUPPLY	3	301PP		M		B63
2QF	APU-FUEL LP VALVE-SUPPLY	3	305PP		M		A63
1WF	APU-FIRE EXTING-SQUIB A	5	301PP		M		B61
2WF	APU-FIRE EXTING-SQUIB B	5	305PP		M		A61
3WF	APU-FUEL ISOL VALVE-CTL	3	301PP		M		B62
4WF	APU-FUEL LP VALVE-CTL	3	305PP		M		A62
7WF	APU-FIRE EXTING-SQUIB TEST	3	305PP		M		A60
30WF	APU-FIRE EXTING-AUTO EXTING GND TEST	3	301PP		M		B60

D. Circuit Breakers Located on Panel 132VU

FIN	DESIGNATION	RTG	BUS BAR	P/H	M	C	POS
2DA	ANTI ICE-PROBES CAPT TAT	5	105XP	A	M		K69
70DA	ANTI ICE-PROBES F/O TAT	5	202XP	A	M		M72
3DB	ANTI ICE-RAIN RPLNT CAPT	3	307PP		M		L71
4DB	ANTI ICE-RAIN RPLNT F/O	3	307PP		M		L72
7DG	ANTI ICE-WINDOW HEAT L SIDE WINDOW	15	105XP	C	M		L64
8DG	ANTI ICE-WINDOW HEAT R SIDE WINDOW	15	205XP	C	M		L70
1DM	ANTI ICE-WING ANTI ICE-CTL AND WARN	3	101PP		M		P70
54DM	ANTI ICE-APU BOOST SIGNAL	3	104PP		M		N64
1LA	LIGHTING-EXTERIOR LT-NAV 2	5	103XP	B	M		N75
11LA	LIGHTING-EXTERIOR LT-NAV 1	5	103XP	A	M		N78
1LB	LIGHTING-EXTERIOR LT-LAND L SUPPLY	7,5	103XP	A	M		N80
2LB	LIGHTING-EXTERIOR LT-LAND R SUPPLY	7,5	202XP	B	M		M78
3LB	LIGHTING-EXTERIOR LT-LAND L CTL	3	103XP	A	M		N81
4LB	LIGHTING-EXTERIOR LT-LAND R CTL	3	202XP	B	M		M77
1LC	LIGHTING-EXTERIOR LT-TURN OFF L	5	103XP	B	M		N74
2LC	LIGHTING-EXTERIOR LT-TURN OFF R	5	202XP	A	M		M75
58LE	LIGHTING-INT LT-STORM	3	202XP	C	M		M84
1LR	LIGHTING-EXTERIOR LT-TAXI AND T.O L SUPPLY	10	202XP	C	M		M81
2LR	LIGHTING-EXTERIOR LT-TAXI AND T.O R SUPPLY	10	202XP	B	M		M80
10LR	LIGHTING-EXTERIOR LT-TAXI AND T.O CTL	3	101PP		M		P75
1LV	LIGHTING-EXT LT-BEACON UPPER	3	301XP	B	M		K73
5LV	LIGHTING-EXT LT-BEACON LOWER	3	301XP	B	M		K74
11LV	LIGHTING-EXTERIOR LT-STROBE	7,5	103XP	A	M		N79
1LX	LIGHTING-EXTERIOR LT-WING L	3	202XP	A	M		M73
4LX	LIGHTING-EXTERIOR LT-ENG R	5	101PP		M		P74
5LX	LIGHTING-EXTERIOR LT-ENG L	5	101PP		M		P73
6LX	LIGHTING-EXTERIOR LT-WING R	3	202XP	A	M		M74
1LY	LIGHTING-EXTERIOR LT-LOGO L	7,5	202XP	B	M		M79
3LY	LIGHTING-EXTERIOR LT-LOGO R	7,5	202XP	C	M		M82
65QA	FUEL-AUTO FEED CTL	3	106PP		M		M55
66QA	FUEL-AUTO FEED WARN	3	104PP		M		N55
149QA	FUEL-INR PUMPS EMER SUPPLY	3	305PP		M		L52

FIN	DESIGNATION	RTG	BUS BAR	P/H	M	C	POS
51QB	FUEL-ISOL VALVES L OUTR AND INR TK FLASHER	3	305PP		M		L54
52QB	FUEL-ISOL VALVES R OUTR AND INR TK FLASHER	3	305PP		M		L57
1QE	FUEL-X FEED VALVE-MOTOR 2	3	106PP		M		L61
2QE	FUEL-X FEED VALVE-MOTOR 1	3	305PP		M		L60
1QG	FUEL-LP VALVES ENG 1 MOTOR 1	3	106PP		M		M53
2QG	FUEL-LP VALVES ENG 2 MOTOR 1	3	104PP		M		N54
1QL	FUEL-TRIM TANK-FWD XFR MAIN VALVE	3	104PP		M		K53
4QL	FUEL-TRIM TANK-AFT L AND XFR VALVE	3	106PP		M		K56
1QT	FUEL-FQI SUPPLY AND IND	3	901PP		M		P59
3QT	FUEL-FQI CHAN SUPPLY 1	3	901XP	A	M		P60
4QT	FUEL-FQI CHAN SUPPLY 2	3	301XP	B	M		P61
28WJ	LIGHTING-PASSENGERS SIGNS-SEAT BELTS/TD SEAT	5	101PP		M		P83
29WJ	LIGHTING-PASSENGERS SIGNS-SEAT BELTS/RETURN	5	101PP		M		P82
30WJ	LIGHTING-PASSENGERS SIGNS-SEAT BELTS	5	101PP		M		P81
31WJ	LIGHTING-PASSENGERS SIGNS-NO SMOKING	7.5	101PP		M		P80
143WJ	LIGHTING-PASSENGERS SIGNS-NO SMOKING	5	101PP		M		P84
24WL	LIGHTING-EMER LT-EXIT LT CHARGER	3	105XP	B	M		L75

E. Circuit Breakers Located on Panel 133VU

	FIN	DESIGNATION	RTG	BUS BAR	P H	M	C	POS
	2CB	FLT CTL-SERVO CTL AND THS JAM DET	3	106PP		M		U64
	1CF	FLT CTL-PITCH UNCOUPLING SOLENOID	5	104PP		M		V64
	3CG	FLT CTL-AIL TRIM	3	104PP		M		V63
	1CN	FLT CTL-FLAPS AND SLATS POS IND	3	432XP	A	M		S66
	2CN	FLT CTL-FLAPS AND SLATS POS ECAM	3	231XP	A	M		S65
R	9CP	FLT CTL-EFCU-LAND RECOVERY SUPPLY SPLR 2 AND 3	3	301PP		M		T66
R	54CP	FLT CTL-LAND RECOVERY SUPPLY SPLR 2/3/5/7	3	432XP	A	M		S67
R	72CP	FLT CTL-EFCU-LAND RECOVERY SUPPLY SPLR 5 AND 7	3	301PP		M		T67
	8CV	FLT CTL-SFCC NORM SUPPLY SLATS SYS 2	7.5	110PP		M		T64
R	9CV	FLT CTL-SFCC LAND RECOVERY SUPPLY SLATS SYS 2	7.5	305PP		M		R66
	10CV	FLT CTL-SFCC LAND RECOVERY SUPPLY FLAPS SYS 1	7.5	305PP		M		R67
	11CV	FLT CTL-FLAPS WTB 1	3	307PP		M		Q66
	12CV	FLT CTL-FLAPS WTB 2	3	104PP		M		Q67
	13CV	FLT CTL-SLATS WTB 1	3	307PP		M		Q65
	14CV	FLT CTL-SLATS WTB 2	3	110PP		M		Q64
	1EV	ENGINES-ENG 1 AND 2 VIB	3	106XP	C	M		S71
	1GC	HYDRAULIC-NOSE WHEEL STRG	3	104PP		M		T53
	2GG	HYDRAULIC-BRAKES SYSTEM CTL UNIT NORM SUPPLY	3	106PP		M		U55
	4GG	HYDRAULIC-BRAKES SYSTEM CTL UNIT NORM SUPPLY	3	104PP		M		V55
	5GG	HYDRAULIC-BRAKES SYSTEM CTL UNIT CTL AND WARN	3	305PP		M		T56
	41GG	HYDRAULIC-BRAKES SYSTEM CTL UNIT NORM SUPPLY	3	106PP		M		U56
	42GG	HYDRAULIC-BRAKES SYSTEM CTL UNIT NORM SUPPLY	3	104PP		M		V56
	98GG	HYDRAULIC-BRAKES SYSTEM CTL UNIT LAND RECOVERY SUPPLY	3	307PP		M		T55
	101GK	HYDRAULIC-ENG 1 AND 2 FIRE VALVES	3	105XP	C	M		S57
	103GK	HYDRAULIC-ENG 1 AND 2 FIRE VALVES	3	105XP	C	M		S58
	1GW	HYDRAULIC-BRAKES TEMP DET UNIT	3	103XP	A	M		R58
R	1KC	ENGINES-ENG 1 FUEL HP VALVE WARN	3	301PP		M		T68
	2KC	ENGINES-ENG 2 FUEL HP VALVE WARN	3	305PP		M		R73
	3KC	ENGINES-ENG 1 FUEL HP VALVE CTL	3	307PP		M		T69
	4KC	ENGINES-ENG 2 FUEL HP VALVE CTL	3	307PP		M		T70
	1KM	ENGINES-ENG 1 REVERSE CTL	7.5	101PP		M		U69
	2KM	ENGINES-ENG 2 REV CTL	7.5	104PP		M		V74
	1KR	ENGINES ENG 1 AND 2 IDLE CTL	3	305PP		M		R70

FIN	DESIGNATION	RTG	BUS BAR	P H	M	C	POS
R **ON A/C 101-200,							
1KU	NACELLE COOLING-ENG 1 PWR	5	214XP	C	M		R74
2KU	NACELLE COOLING-ENG 2 PWR	5	214XP	C	M		R75
3KU	NACELLE COOLING-ENG 1 & 2 CTL	5	601PP		M		Q75
R **ON A/C ALL							
8PC	ELEC-DC TIE CURRENT SENSOR	3	305PP		M		T77
11PU	ELEC-REV CTR SENS TR 1	3	104PP		M		V76
12PU	ELEC-REV CTR SENS TR 2	3	106PP		M		U76
13WY	ELEC-CBMS OVERHEAD PANEL	3	106PP		M		U79
1XD	ELEC-STAT INV WARN	3	305PP		M		T80
1XE	ELEC-STAT INV CTL	3	305PP		M		T79
5XS	ELEC-APU GEN GCU WARN	3	301PP		M		U84
5XU	ELEC-GCU WARN GEN 1	3	305PP		M		T81
6XU	ELEC-GCU WARN GEN 2	3	305PP		M		T82
15XU	ELEC-XFR 1 CNTOR CTL	7.5	106PP		M		U81
16XU	ELEC-XFR 2 CNTOR CTL	3	301PP		M		U85
18XU	FLT CTL-ENG 2 GCU BACK UP SUPPLY	7.5	104PP		M		V81
9XX	ELEC-TR2 CTL NORM	3	205XP	A	M		V85

1. Operational Test

A. Reason for the Job
- To test operation of circuit breaker monitoring system.

B. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	AC External Power

C. Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Job set-up
- Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
- Make certain that electronics racks ventilation is correct.
- Close overhead panel and rear panel monitored circuit breakers (green capped).
- On panel 472VU, ANN LT switch is in READ position.

(2)Test

	ACTION	RESULT
	1. On L overhead C/B panel 21VU - open any monitored circuit breaker located on line A, B, C, D, E, F, G, H or J, rank 1 thru 14.	On maintenance panel 472VU - check that OPEN legend of C/B MONITOR/OVERHEAD PANEL/ABCDEFGHJ 1/14 pushbutton switch comes on.
R	NOTE : a monitored circuit breaker is identified by a green colored cap.	On left ECAM display unit, the following message is displayed : C/B MONITOR OPEN
R	2. On ECAM control panel - press CLR pushbutton switch.	On left ECAM DU, previous message disappears.
	3. On maintenance panel 472VU - press ABCDEFGHJ/1/14 pushbutton switch	OPEN legend goes off. INHIB legend comes on. On left ECAM DU the following message is displayed C/B MONITOR INHIB
R	4. On ECAM control panel - Press CLR pushbutton switch.	On L ECAM DU previous message disappears.
	5. On maintenance panel 472VU - place ANN LT switch in TEST position.	On C/B MONITOR panel, all OPEN and INHIB legends come on.

ACTION	RESULT
- place **ANN LT** switch in **OFF** position. - place **ANN LT** switch in **READ** position. - release **ABCDEFGHJ/1/14** push-button switch	All legends go off on **C/B MONITOR** panel. **INHIB** legend of **C/B MONITOR/OVERHEAD PANEL/ABCDEFGHJ/1/14** pushbutton switch comes on **INHIB** legend goes off.
6. On overhead **C/B** panel 21VU - close circuit breaker previously opened.	
7. Repeat step 1 thru 6 with any monitored circuit breaker located on the following panels except **ANN LT** switch **TEST** position check : - on panel 22VU, line **A, B, C, D, E, F, G, H** or **J**, rank 15 thru 28. - on panel 131VU, line **A, B, C, D, E, F, G** or **H**, rank 51 thru 65 - on panel 132VU, line **J, K, L, M, N** or **P**, rank 51 thru 65. - on panel 132VU, line **J, K, L, M, N** or **P**, rank 66 thru 85. - on panel 133VU, line **Q, R, S, T, U** or **V**, rank 51 thru 65. - on panel 133VU, line **Q, R, S, T, U** or **V**, rank 66 thru 85.	Same results. On **C/B MONITOR** panel, pushbutton switch corresponding to location of opened circuit breaker will be taken into account.

(3)Close-up
(a)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(b)Restore system and aircraft to normal operating condition.

2. Extended Operational Test

A. Reason for the Job
- To check correct operation of the whole circuit breaker monitoring system.

B. Equipment and Materials

ITEM	DESIGNATION
Referenced Procedure - 24-41-00, P. Block 301	A/C External Power

C. Procedure

WARNING : BEFORE POWER IS SUPPLIED TO THE AIRCRAFT, MAKE CERTAIN THAT ELECTRICAL CIRCUITS UPON WHICH WORK IS IN PROGRESS ARE ISOLATED.

(1)Job set-up
- Energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
- Make certain that electronics racks ventilation is correct.
- Close overhead panel and rear panel monitored circuit breakers (green capped).

(b)On maintenance panel 472VU, all C/B MONITOR pushbutton switches are released.

(2)Test

ACTION	RESULT
1. On lower section of L overhead C/B panel 21VU, open and close in turn all green capped circuit breakers	On maintenance panel 472VU, check that OPEN legend of C/B MONITOR/ OVERHEAD PANEL/ABCDEFGHJ/1/14 pushbutton switch 19WY comes on when any circuit breaker is open. OPEN legend goes off when circuit breaker is closed. On left ECAM display unit, the following message is displayed : C/B MONITOR OPEN
2. On lower section of R overhead C/B panel 22VU, open and close in turn all green capped circuit breakers	On maintenance panel 472VU, check that OPEN legend of C/B MONITOR/ OVERHEAD PANEL/ABCDEFGHJ/15/28 pushbutton switch 20WY comes on when any circuit breaker is open. OPEN legend goes off when circuit breaker is closed.
3. On rear C/B panel 131VU, open and close in turn all green capped circuit breakers.	On maintenance panel 472VU, check that OPEN legend of C/B MONITOR/ REAR PANEL/ABCDEFGH/51/65 pushbutton switch 14WY comes on when any circuit breaker is open.

ACTION	RESULT
	OPEN legend goes off when circuit breaker is closed.
4. On rear **C/B** panel **132VU**, open and close in turn all green capped circuit breakers on lines **J, K, M ,N** and **P**, rank **51** thru **65**	On maintenance panel **472VU**, check that **OPEN** legend of **C/B MONITOR/ REAR PANEL/JKLMNP/51/65** pushbutton switch **15WY** comes on when any circuit breaker is open. **OPEN** legend goes off when circuit breaker is closed.
5. On rear **C/B** panel **132VU**, open and close in turn all green capped circuit breakers on lines **J, K, L, M, N** and **P**, rank **66** thru **85**	On maintenance panel **472VU**, check that **OPEN** legend of **C/B MONITOR/ REAR PANEL/JKLMNP/66/85** pushbutton switch **16WY** comes on when any circuit breaker is open. **OPEN** legend goes off when circuit breaker is closed.
6. On rear **C/B** panel **133VU**, open and close in turn all green capped circuit breakers on lines **Q, R, S, T, U** and **V**, rank **51** thru **65**	On maintenance panel **472VU**, check that **OPEN** legend of **C/B MONITOR/ REAR PANEL/QRSTUV/51/65** pushbutton switch **17WY** comes on when any circuit breaker is open. **OPEN** legend goes off when circuit breaker is closed.
7. On rear **C/B** panel **133VU** open and close in turn all green capped circuit breakers on lines **Q, R, S, T, U** and **V**, rank **66** thru **85**	On maintenance panel **472VU**, check that **OPEN** legend of **C/B MONITOR/ REAR PANEL/QRSTUV/66/85** pushbutton switch **18WY** comes on when any circuit breaker is open. **OPEN** legend goes off when circuit breaker is closed.
8. On the following panels, open one monitored circuit breaker (green capped) **22VU** **131VU** **132VU (51/65)** **132VU (66/85)** **133VU (51/65)** **133VU (66/85)**	On maintenance panel **472VU**, **OPEN** legend of all **C/B MONITOR** pushbutton switches must be on except **OPEN** legend of **OVERHEAD PANEL/ ABCDEFGHJ/1/14** pushbutton switch.
9. On maintenance panel **472VU**, place **ANN LT** switch in **READ** position and press the six **C/B MONITOR** pushbutton switches with **OPEN**	**INHIB** legend of **C/B MONITOR** pushbutton switches pressed in must come on.

ACTION	RESULT
legend on.	
10. Release the six **C/B MONITOR** pushbutton switches and close the six circuit breakers previously opened. Place **ANN LT** switch back to **OFF** position.	All legends go off.

(3)Close-up
(a)De-energize the aircraft electrical network (Ref. 24-41-00, P. Block 301).
(b)Restore system and aircraft to normal operating condition.